

THE TE AROHA SILVER AND GOLD MINING COMPANY: THE INTRODUCTION OF AUSTRALIAN CAPITAL TO WAIORONGOMAI

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Abstract: *William Robert Wilson, one of the founders of B.H.P., visited New Zealand on several occasions both to obtain relief for his rheumatism and to acquire racehorses. In 1888, after Josiah Clifton Firth and Henry Hopper Adams extolled the wonders of the Waiorongomai goldfield, he visited it, took samples for testing, and expressed confidence in its great future. Upon his return to Australia he formed the Te Aroha Silver and Gold Mining Company on terms that benefited the promoters but did not provide adequate working capital.*

The new company developed some of the existing mines and did some prospecting of nearby areas. The battery, completely overhauled on the American pattern under the supervision of American experts, was the best plant in Australasia. When it operated, after obtaining some very positive results it ran out of both suitable ore and fluxes and had to close, and mining ceased. The company then sought a government subsidy to drive an expensive low-level tunnel to provide cheaper access to the lodes at depth, threatening to dismantle the plant and remove it to Australia if the subsidy was not provided. As Cabinet did not want to set a precedent, its request was declined; accordingly, the plant was dismantled and sent to Australia. For a time its mines were held under protection, to the annoyance of local miners, but were then abandoned.

The company failed because its plant had an inappropriate process for the complex and refractory local ore, did not have cheap fluxes, and there was insufficient high-grade ore. Post mortems agreed it should have spent more time developing the mines and testing the ore before erecting such an expensive plant. The collapse of this company held back the development of the field for years.

WILLIAM ROBERT WILSON

William Robert Wilson was born in 1850 in Northern Ireland.¹ After arriving in Geelong in Victoria as a child, he became a miner at the age of

¹ *Observer*, 4 February 1899, p. 24; Geoffrey Blainey, *The Rise of Broken Hill* (Melbourne, 1968), p. 39; H.J. Gibbney and Ann G. Smith, *A Biographical Register 1788-1939: vol. 2: L-Z* (1988).

17, when 'he went to New Zealand, and became interested in alluvial companies for some five years'.² This enabled a New Zealand newspaper to describe him as 'an old New Zealander' who had 'spent several years on the West Coast during the early and palmy days of that locality'.³ He then went to Port Pirie in South Australia 'and engaged in shipping and commercial pursuits', becoming part owner of several mines near Adelaide.⁴ According to an obituary in the *Sydney Bulletin*, in 1879 he was a commercial agent at Port Augusta, South Australia, where he 'made a small fortune out of a land-boom. This, his second, he promptly dropped, and he figured as a stone-broke agent in Adelaide in the early eighties'.⁵

After floating some unsuccessful mining companies on the Adelaide Stock Exchange, he 'secured the secretaryship of Barrier Ranges Association, and went to Silverton, managing the Day Dawn long ere Broken Hill saw a smelter'.⁶ He managed what Roy Bridges called the Day Dream on behalf of the Barrier Ranges Silver Mining Company from 1880-1884; in 1882 a township bearing his name was surveyed at a camp in the centre of this part of the field.⁷ The biggest entrepreneur at Silverton, he was the first experienced mining man to invest in Broken Hill, being the only local mine manager to consider it worth a gamble. When the Broken Hill Company was established in 1884, Wilson, then manager of the Barrier Ranges Association, bought one-fourteenth of the interests, cheaply. In the following year he attempted to buy half the hill from the company, unsuccessfully, but in June, when aged 35, he was one of four men who floated the Broken Hill Proprietary Company, and was one of the largest shareholders.⁸ On the recommendation of his brother Samuel, a mining engineer, director, and the second general manager until the appointment of William H. Patton,⁹ Wilson became a director in 1886, holding this

² *Age* (Melbourne), 29 May 1900, p. 6.

³ *Auckland Weekly News*, 31 March 1888, p. 21.

⁴ *Age*, 29 May 1900, p. 6.

⁵ *Bulletin* (Sydney), 16 June 1900, p. 13.

⁶ Blainey, *Rise of Broken Hill*, p. 40; *Sydney Morning Herald*, 29 May 1900, p. 6; *Bulletin*, 16 June 1900, p. 13.

⁷ Roy Bridges, *From Silver to Steel: The romance of the Broken Hill Proprietary* (Melbourne, 1920), pp. 44, 46-47.

⁸ *Sydney Morning Herald*, 29 May 1900, p. 6; Bridges, pp. 74, 89, 92.

⁹ *Age*, 29 May 1900, p. 6; *Te Aroha News*, 8 January 1890, p. 2; Bridges, pp. 146-147; Blainey, *The Rush That Never Ended: A history of Australian mining* (Melbourne, 1963),

position for six years, and was chairman of directors in 1891 and 1892.¹⁰ He experimented with methods of treatment,¹¹ and was the first director with sufficient detailed knowledge to realize that nobody in Australia had the requisite ability to manage the mine profitably. In July 1886, the directors sent him abroad ‘to sign the best man money could sign’, and in Nevada he secured as their general manager Patton, of the Consolidated Virginia Company and manager of the Great Comstock mine and an experienced metallurgist and mining engineer. Under his direction the mine became very successful.¹²

In 1888 Wilson was described as ‘a practical miner of many years’ experience in different parts of the world’ and ‘second to none as an expert in the treatment of ores and the value of mineral stone’.¹³ This probably exaggerated his skills, but was an example of the praise regularly showered upon him, especially by those who had been or who hoped to be the beneficiaries of his skills or his capital. The *Te Aroha News* wrote that he had ‘great experience in all matters relating to mining’, was ‘full of enterprise’, and had ‘done much to develop and enhance the value’ of the mines he was connected with.¹⁴ He made the original recommendation that Broken Hill be worked by an open cut,¹⁵ and was described by an Englishman who inspected Australasian mines as one of ‘the very ablest men I have ever met outside London or New York’.¹⁶ A director of other mining companies, he invested in mines in New South Wales, South Australia, and Tasmania.¹⁷ He was, for example, a large shareholder and a director of the Australian Smelting and Refining Company of Adelaide.¹⁸ He was involved with other leading B.H.P. figures in developing mines at

pp. 153-154; Alan Trengrove, ‘“What’s Good for Australia...!”: The Story of BHP (Stanmore, NSW, 1975), p. 15.

¹⁰ *Sydney Morning Herald*, 29 May 1900, p. 6; *Thames Star*, 20 June 1900, p. 2.

¹¹ Bridges, p. 144.

¹² *Sydney Morning Herald*, 29 May 1900, p. 6; *Age*, 29 May 1900, p. 6; Blainey, *Rush That Never Ended*, pp. 146-147, 153-154; Blainey, *Rise of Broken Hill*, p. 40.

¹³ Editorial, *Waikato Times*, 22 March 1888, p. 2.

¹⁴ *Te Aroha News*, 1 September 1888, p. 2.

¹⁵ Bridges, p. 176.

¹⁶ Raymond Radclyffe, *Wealth and Wild Cats: Travels and researches in the gold-fields of Western Australia and New Zealand* (London, 1898), p. 113.

¹⁷ Gibbney and Smith.

¹⁸ *Te Aroha News*, 23 March 1888, p. 2, 31 March 1888, p. 2.

Captain's Flat, near the future city of Canberra.¹⁹ In 1896, with his brother he invested largely in the new Menzies goldfield, to the north of Coolgardie.²⁰

VISITING NEW ZEALAND

In 1883, Wilson visited New Zealand because of his health. Bridges described him as 'big and bluff' and Blainey as a 'burly Ulsterman' over six feet in height, but he arrived suffering from an acute attack of rheumatism.²¹ Being 'greatly improved by the use of the baths at Rotorua, especially by one at Whakarewarewa', he described New Zealand as 'the finest health resort in the colonies'.²² On his next visit, in 1888, 'he was so disabled by rheumatism that he had to get down to the steamer on crutches. He spent three weeks at Rotorua, patronizing chiefly at the baths at Whakarewarewa', after which he threw his crutches away and walked 'as freely as any man'.²³ He continued to visit Rotorua for health reasons during the 1890s.²⁴ Whether he used Te Aroha's hot springs was not recorded.

In June 1888, a Waiorongomai correspondent referred to him as 'Millionaire Wilson',²⁵ presumably because his scrip in B.H.P. was valued at over £1,000,000.²⁶ The *Te Aroha News* believed him to be 'a gentleman of unlimited capital',²⁷ and the *New Zealand Herald* understood him to be 'one of the leading mining capitalists of Australia' and 'one of the wealthiest of those who are connected with the greatest of the now famous Broken Hill mines'.²⁸ His wealth meant his visits to New Zealand for his health and his interests in mining also allowed him to indulge in his passion for

¹⁹ Blainey, *Rush That Never Ended*, p. 151.

²⁰ Radclyffe, p. 46; Blainey, *The Golden Mile* (St Leonards, 1993), p. 61.

²¹ Bridges, p. 63, and photograph facing p. 174; Blainey, *Rush That Never Ended*, pp. 146-147; *Auckland Star*, 21 March 1888, p. 8.

²² *Auckland Star*, 21 March 1888, p. 8; *Auckland Weekly News*, 31 March 1888, p. 21.

²³ *Auckland Weekly News*, 31 March 1888, p. 21.

²⁴ *Auckland Weekly News*, 9 December 1898, p. 18; for details of his declining health, see *Auckland Weekly News*, 1 June 1900, p. 42.

²⁵ Waiorongomai Correspondent, *Waikato Times*, 14 June 1888, p. 2.

²⁶ *Thames Star*, 20 June 1900, p. 2.

²⁷ *Te Aroha News*, 1 September 1888, p. 2.

²⁸ Editorial, *New Zealand Herald*, 23 March 1888, p. 4.

racehorses. Of his Port Augusta days, it was recalled that he managed the best race meeting ever held there.²⁹ In 1890 he bought his own racing stud, St Albans, near Geelong, spending more money on racing 'than any other Australian in the 1890s'. Whilst he made it the most successful stud in Australia, winning many races, despite several attempts he failed to win the Melbourne Cup.³⁰ He was described as 'a man of wide interests' whose nickname was 'St Albans'.³¹ He earned the reputation of being one of Australia's 'straightest sportsmen' and 'a splendid specimen of the best class of sportsman'.³² In January 1890, he bought a racing mare, a steeplechaser, and several thoroughbred horses in New Zealand and shipped them back to Australia.³³ In May 1891, he bought the Pah estate, near Auckland, to be used for bloodstock breeding.³⁴ In the following year he bought a colt for 2,000 guineas,³⁵ the last purchase he made in New Zealand. This colt, named Carnage, won the Victorian Racing Club Derby and 'came within an ace of winning the Melbourne Cup'.³⁶ An English visitor described Wilson and his brother as 'famous throughout all Australia as owners of the best race-horses in Australasia, and well known in England as cute judges and good sportsmen', St Albans being the 'most beautiful of stud farms'.³⁷

INTERESTED IN WAIORONGOMAI MINING

Wilson became involved in Waiorongomai mining through the coincidence that in late 1886 he and Henry Hopper Adams³⁸ and Josiah

²⁹ *Bulletin*, 16 June 1900, p. 13.

³⁰ *Sydney Morning Herald*, 29 May 1900, p. 6; *Te Aroha News*, 4 June 1890, p. 2; 'Mercutio', 'Local Gossip', *Auckland Weekly News*, 14 November 1891, p. 7; *Bulletin*, 16 June 1900, p. 13; *Thames Star*, 20 June 1900, p. 2; Blainey, *Rise of Broken Hill*, p. 40.

³¹ Bridges, p. 174.

³² *Bulletin*, 9 June 1900, p. 25; *Age*, 29 May 1900, p. 6.

³³ *Waikato Times*, 21 January 1890, p. 2; *Te Aroha News*, 8 January 1890, p. 2, 25 January 1890, p. 2; cartoon of 'a buyer from Broken Hill' in *Observer*, 11 January 1890, p. 6.

³⁴ *Thames Star*, 15 May 1891, p. 2; *Observer*, 13 June 1891, p. 7.

³⁵ *Observer*, 18 August 1892, p. 12.

³⁶ Article on Sylvia Park stud, *New Zealand Herald*, n.d., press cutting in H. Rodenwald, Scrapbooks, vol. 2, no pagination, MS 98/92, Library of the Auckland Institute and War Memorial Library.

³⁷ Radclyffe, pp. 46, 115.

³⁸ See paper on his life.

Clifton Firth³⁹ returned from America on the same ship.⁴⁰ Wilson had travelled to Europe and America to find experts capable of mining and treating Broken Hill ore,⁴¹ whilst Adams sought new processes to treat Waiorongomai ore. Adams informed those attending a banquet in his honour that he had travelled ‘more or less’ in Wilson’s company ‘for nearly a month’, and found him to be ‘a thoroughly practical man in all mining matters, and an expert’. Adams ‘promised him before they parted, that if he ever heard of a good thing in the way of mines in this Colony to let him know of it’, which he later did.⁴² According to another version, Firth’s descriptions of Waiorongomai coupled with Adams’ assurances that the ore was payable so impressed Wilson that he only needed to view the main reef to confirm it would be payable if properly treated.⁴³

When visiting New Zealand in March 1888, mainly ‘for the benefit of his health’,⁴⁴ Wilson inspected mines in the Upper Thames district. According to a leading mine manager, Thomas Gavin,⁴⁵ Adams ‘promptly communicated’ with him ‘on his arrival in Auckland, inducing him to come and inspect’ Waiorongomai.⁴⁶ The *Te Aroha* newspaper was, naturally, excited, for Wilson had ‘great and varied experience in connection with mining matters throughout both America and the Colonies’ and was ‘thoroughly conversant with the most modern processes for the treatment of ore’. In his two days of investigation Wilson ‘personally selected and brought away with him a number of samples’ of Waiorongomai and Tui ore ‘for testing purposes, and made careful inquiries with respect to mining matters generally’, forming ‘a favourable impression of the district generally as a field for mining operations on an extensive scale’.⁴⁷ But he would not decide whether to purchase the property until he received the results of tests on these samples.⁴⁸ The *Te Aroha News* quoted his impressions:

³⁹ See paper on the Battery Company.

⁴⁰ *Waikato Times*, 16 November 1886, p. 2.

⁴¹ Bridges, p. 174.

⁴² *Te Aroha News*, 14 April 1888, p. 2; see also H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 42.

⁴³ H.A. Gordon to Minister of Mines, 24 July 1895, *AJHR*, 1895, C-3, p. 66.

⁴⁴ Editorial, *Waikato Times*, 24 March 1888, p. 2.

⁴⁵ See paper on his life.

⁴⁶ *Te Aroha News*, 31 March 1888, p. 2.

⁴⁷ *Te Aroha News*, 21 March 1888, p. 2.

⁴⁸ *Auckland Weekly News*, 12 May 1888, p. 7.

I am favourably impressed, and think better times may be looked for in the near future. Much depends on the men who get the control of the various properties which I learn are under offer in England and elsewhere. Many a good mine has been muddled by mistakes in the treatment of its produce, and I have seen much ore here that will require skilful and correct treatment; otherwise its value, or a large portion of it, will be lost. In the Broken Hill mine we have imported the best available talent in each department; and much of the success of that mine is due to this course having been taken at an early stage in its existence. To explain more fully what I mean by laying so much stress on this point, I may say, that the metallurgist in charge at the Hill (now Mr H[erman] H[enry] Schlapp) who, I am proud to say I selected for the position when visiting America recently, is saving his present salary, which is £2000 per annum, *every fortnight*. That is, his slags show that much less value than those made by his predecessor. Experience has taught us that it matters little what salary is paid, if the right man is got for the position you wish to fill. In this district, more than any I have yet visited, the *best* skill is needed, as beyond question a very large proportion of the ores are extremely base and refractory. Of course after a two days visit I cannot give a very decided opinion, but if the values stated are correct (and I have no reason to doubt them) there are many thousands of tons of ore in sight, in more claims than one, that should give a fair profit, *if properly treated*.⁴⁹

(Schlapp was formerly superintendent of the Pueblo Smelting and Refining Works, Colorado. In 1886 Wilson chose him as metallurgist in charge of smelting after satisfying himself 'by exhaustive enquiries that his qualifications' were 'of the highest order'.⁵⁰ For a time second-in-command at B.H.P., as 'possibly the foremost metallurgist in Australia' he made significant improvements to the treatment and became one of the first vice-presidents of the Australasian Institute of Mining Engineers in 1892; he resigned from B.H.P. in the following year.)⁵¹

⁴⁹ *Te Aroha News*, 21 March 1888, p. 2.

⁵⁰ Bridges, pp. 144, 145, 174; Blainey, *Rush That Never Ended*, pp. 154-155.

⁵¹ Blainey, *Rise of Broken Hill*, pp. 45, 57; Blainey, *Rush That Never Ended*, pp. 157, 218, 220; Bridges, pp. 147, 184; John M. Dew (compiler), *Mining People – A century: Highlights of the first hundred years of the AusIMM 1893-1993* (Melbourne, 1993), pp. 14, 20, 21, 74, 147-148, 188; for more biographical details, see Google, especially *Australian Dictionary of Biography*, vol. 11 (Melbourne, 1988).

On 26 March Adams produced a report for Wilson detailing the mines' splendid prospects, mainly in the New Find.⁵² 'Very recently it was found that the supposed wall' in the latter was a silver-bearing lode, and he claimed that gold and silver had been found wherever any work had been done on the main reef. He stressed the number of branch veins running 'through a very favourable class of country', gold having been obtained 'in all parts' where they were 'worked upon'. As only a limited amount of capital had been spent upon prospecting, he had 'no doubt' further prospecting would produce 'satisfactory results'. He provided all the assays made from the Battery Company's drillings and explained the advantages of mining on the steep and heavily wooded hillside. He was 'quite sure that, when properly prospected and opened up, and the necessary machinery procured for the successful treatment of the ore, it will prove a very profitable investment and return a satisfactory interest on the capital expended'.⁵³

PURCHASING THE PROPERTY

Judging from his comments when interviewed in Auckland on 22 March, Wilson had already received the gist of this information:

The business is not yet quite concluded, although I see it stated in some of the papers that it is. I may inform you that the purchase involved £29,000 for four-fifths of the property, including the Silver King mine. If the business arrangements are concluded, and I think they will be, Mr H. H. Adams, the manager, whom we have no intention of removing, will be instructed to put on extra labour, and at an early date we will send an expert from Melbourne to advise generally as to what additions or alterations are required to the present plant, and what new plant is needed. In the event of a company being formed, we will start with a capital of £20,000 in the bank for carrying on operations. The water supply will be increased by extending the water races, and should the company be formed a local director will be appointed.... During your visit to Te Aroha you no doubt had a look round the other mines. What do you think of the prospects of the district? Well, Mr Reporter, I don't think I can give you a better proof of my opinions of the district than the fact that I have made this purchase. I think, however, the whole future of the district depends on the men we get to treat the ore, and the plant erected

⁵² See paper on this mine.

⁵³ *Te Aroha News*, 21 April 1888, p. 4, 25 April 1888, p. 3.

for the purpose. Any mistake would have a very bad effect. We propose getting the best advice before deciding on what plant we shall erect, and for that purpose we shall send a skilled expert, whom we have brought from America, to inspect and advise us.

I wish you every success with your purchase.

I thank you for your good wishes. I do not wish to appear prominently in the papers, and would much rather my name was omitted if possible, but I suppose you cannot do that.⁵⁴

When Wilson offered the Battery Company £25,000 for its battery and mines, it declined the offer, arguing that its property was worth at least three times that sum.⁵⁵ It then countered with a price of £30,000, which Wilson declined. Only a short time before his ship left for Australia ‘an agreement was arrived at; and a memorandum of agreement signed right off’ whereby the Battery Company received £25,000 cash for four-fifths of the property and retained a one-fifth interest (worth £20,000) in paid-up shares. Wilson obtained Firth’s Special Claim along with the New Find, Canadian, May Queen, and Galena Licensed Holdings, the battery, tailings plant, and water races.⁵⁶ Included in the sale were from 10,000 to 12,000 tons of tailings, estimated to be worth from £1 14s to £2 per ton and likely to return a profit of 6s per ton,⁵⁷ as well as the lease of the tramway for ten years.⁵⁸ Wilson also purchased the Silver King from its owners, who included Adams and James McCosh Clark,⁵⁹ for £4,000.⁶⁰ On behalf of the company, Adams purchased another five licensed holdings from the Waiorongomai Company for £2 2s each. ‘It was expected, that in view of the stirring times that are in prospect for mining here, they would have fetched a high price but there was no competition’.⁶¹ The *Te Aroha News* believed that Adams ‘would have gone as high as £1,000 to £1,500 rather than miss’

⁵⁴ *Auckland Weekly News*, 24 March 1888, p. 10.

⁵⁵ *Thames Advertiser*, 22 March 1888, p. 2.

⁵⁶ *Thames Advertiser*, 23 March 1888, p. 2; *Te Aroha News*, 24 March 1888, p. 2; George Wilson to Under-Secretary, Mines Department, 4 April 1888, *AJHR*, 1888, C-6, p. 12.

⁵⁷ *Waikato Times*, 12 April 1888, p. 2; *Te Aroha News*, 21 April 1888, p. 4, 4 May 1889, p. 2.

⁵⁸ *Te Aroha News*, 24 March 1888, p. 2; Piako County Council, Minutes of Meeting of 13 July 1888, Matamata-Piako District Council Archives, Te Aroha.

⁵⁹ See paper on the Battery Company.

⁶⁰ *Te Aroha News*, 24 March 1888, p. 2; Te Aroha Warden’s Court, Assignments 1888, BBAV 11581/9a, ANZ-A.

⁶¹ *Waikato Times*, 14 April 1888, p. 2.

acquiring them.⁶² In February 1889, it bought the Tower from Adams for £20 and in April the Alameda, on the flat near the settlement.⁶³ In all, it acquired 225 acres.⁶⁴

On 24 March the *Te Aroha News* ecstatically announced the good news:

THE COMING MINING BOOM.
WAIORONGOMAI BATTERY AND SILVER KING MINE
FLOATED INTO A LARGE COMPANY.

NEWS OFFICE,

Te Aroha, Thursday, 1 p.m.

We have just received the following telegram dated Auckland, 12.30 p.m.:

“The Battery Company and Silver King floated into a large Company.

H.H. Adams.”

This is indeed welcome news, exhibiting as it does the favourable opinion formed of our goldfields by capitalists, several of whom have been making searching enquiry with respect thereto, of late --- and is no doubt but a foretaste of a mining boom for the district.

ADVANCE OUR GOLDFIELDS.⁶⁵

According to this newspaper, Wilson had, ‘beyond the shadow of a doubt, obtained an exceedingly valuable property; one that with the capital and enterprise, and scientific knowledge and appliances that will now be brought to bear upon it, will, we firmly believe, prove a handsome dividend paying concern’. It considered that

no more bona fide mining property has ever been floated in the Colony.... The property is a magnificent one, which in every way warrants the expenditure of very large capital for its development, and in the introduction of scientific knowledge and appliances.... We heartily congratulate Mr Wilson on obtaining such a splendid property.⁶⁶

⁶² *Te Aroha News*, 11 April 1888, p. 2.

⁶³ Te Aroha Warden’s Court, Assignments 1889, BBAV 11591/9a, ANZ-A; *Te Aroha News*, 13 April 1889, p. 2.

⁶⁴ H.A. Gordon to Minister of Mines, 8 June 1893, *AJHR*, 1889, C-2, p. 45.

⁶⁵ *Te Aroha News*, 24 March 1888, p. 2.

⁶⁶ *Te Aroha News*, 24 March 1888, p. 2.

Its editorial described the purchase as ‘by far the most important event that has yet occurred in the history of mining in this district’. It could not be ‘regarded as an haphazard venture entered upon merely for the purposes of speculation’ because Wilson had ‘at his command unlimited means’, possessed ‘long and varied experience in mining’, and had ‘thoroughly inspected the property’. How thorough an inspection lasting two days could have been is open to doubt, likewise the claim that he had already devised an ‘extensive scheme’ for opening up the ground. The newspaper was not interested in such quibbles, for it had every reason to expect ‘a tide of prosperity’ greater than that yet experienced on any Upper Thames goldfield.⁶⁷

THE NEW COMPANY

According to a history of the Broken Hill Proprietary Company, ‘many of the Broken Hill magnates’, including Wilson, ‘invested spectacularly in numerous ventures. The hill had given them the wealth, confidence and business experience to invest in mining, smelting, new railways, and other works; and to use a colloquialism, they were prepared to “have a go.” Their reputations and resourcefulness encouraged others to join them’.⁶⁸ Wilson told a journalist that he had not bought the properties for B.H.P. but ‘on behalf of himself and two or three friends’.⁶⁹ In April he ‘privately’ floated the limited liability Te Aroha Silver and Gold Mining Company in Melbourne, with a nominal capital of £200,000, in £1 shares.⁷⁰ The prospectus explained the allocation of half the shares, ‘issued as paid up to 15s each’, to ‘present Proprietors’. The other half was offered to the public at 5s on application and 5s on allotment, when these shares would be ‘issued as paid up to 15s each, and all Shares will then rank alike’. Of the £50,000 thus raised, £29,000 went to the ‘original Owners of the Properties’ and the

⁶⁷ Editorial, *Te Aroha News*, 24 March 1888, p. 2.

⁶⁸ Trengrove, p. 29.

⁶⁹ *New Zealand Herald*, 23 March 1888, p. 5.

⁷⁰ *Te Aroha News*, 14 April 1888, p. 2; ‘Memorandum of Association and Articles of Association of the Te Aroha Silver and Gold Mining Company Limited’, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

balance, 'less expenses of formation of Company, brokerage, &c', would be the working capital.⁷¹ Calls were not to exceed 2s 6d at any one time.⁷²

The *Waikato Times* knew there would 'be something in this for the promoters'.⁷³ One Auckland newspaper noted that the promoters received £100,000 whereas only £21,000 was 'set aside to work the mine'; 'If that is not coining money with a vengeance we don't know what is'.⁷⁴ According to the prospectus, the promoters took 'no profit in cash, being satisfied to await results and profits, to the obtaining of which their own and the directors' best efforts will be directed forthwith'.⁷⁵

By 30 November 1889 there were 157 shareholders; another 21, including Samuel Wilson, had sold their interests during the preceding six months. As details of these earlier holdings were not recorded, it is not known how many had forfeited their shares for non-payment of calls (the total number of forfeited shares was 44,630). There were 26 New Zealand shareholders, mostly residents of Auckland.⁷⁶ Only one lived at Te Aroha: Annie Williams, wife of John, a storekeeper,⁷⁷ had 100 shares. Clark had 10,700 shares, Firth 10,000, his wife 200, one son 200, and another son and two daughters 100 each. His sister Sophia, who lived in London, the wife of his former partner Daniel Bateman Thornton,⁷⁸ had 1,000. The remaining 130 shareholders were Australians, as were all but one (an Auckland) of those who had parted with their interests. Their occupations were not listed in the share register, preventing an adequate assessment of their involvement, if any, in mining. In addition to those named, another ten with

⁷¹ 'Prospectus of the Te Aroha Silver and Gold Mining Company', *Te Aroha News*, 25 April 1888, p. 3.

⁷² F.A. Pulleine, *The Australasian Mining Directory* (Adelaide, 1888), p. 397; *Evening News* (Sydney), 4 June 1889, p. 3.

⁷³ *Waikato Times*, 14 April 1888, p. 2.

⁷⁴ *Bell*, n.d., quoted in *Waikato Times*, 26 April 1888, p. 2.

⁷⁵ 'Prospectus of the Te Aroha Silver and Gold Mining Company', *Te Aroha News*, 21 April 1888, p. 4.

⁷⁶ Share Register of Te Aroha Silver and Gold Mining Company, 30 November 1889, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

⁷⁷ There are no details available of her life, but for his life see *Cyclopedia of New Zealand*, vol. 2, pp. 831-832; *Te Aroha News*, 17 October 1917, p. 2.

⁷⁸ Mona Gordon, *The Golden Age of Josiah Clifton Firth* (Christchurch, 1963), pp. 35, 160-161.

no known familial links to other shareholders held shares,⁷⁹ including the wife of James Smith of Auckland; her husband invested in many goldmines.⁸⁰

At this date Wilson, the chairman of directors, held 17,062 shares.⁸¹ Clark, the local director, was registered under the Foreign Companies Act as its attorney in New Zealand.⁸² The other original directors, all Australian, were William Peter McGregor, Charles William Chapman, and William Jamieson.⁸³ McGregor had been a director of Barrier Ranges Silver Mining Company and in 1886 became chairman of directors of B.H.P.⁸⁴ Chapman, of Melbourne, though born in New Zealand, was one of ‘the most reputable men in Australian mining history’, investing in mines in several states and owning a metallurgical works in South Australia as well as a variety of other business interests.⁸⁵ Jamieson, one of the first to develop the mines at Broken Hill and a founder of B.H.P., was appointed its first managing director even though he was a surveyor, not a miner.⁸⁶ Blainey described him as a big speculator who preferred to reinvest profits to gain larger rewards than ‘gouging out the bonanzas for the sake of short and

⁷⁹ Share Register, 30 November 1889, Te Aroha Silver and Gold Mining Company, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

⁸⁰ See paper on Henry Hopper Adams.

⁸¹ Share Register, 30 November 1889, Te Aroha Silver and Gold Mining Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

⁸² *New Zealand Gazette*, 25 October 1888, p. 1151.

⁸³ Company Files, VPRS 932, Victorian Public Record Office, Melbourne; *Te Aroha News*, 6 April 1889, p. 2, 10 April 1889, p. 2.

⁸⁴ Bridges, pp. 47, 142.

⁸⁵ See K.H. Kennedy, ‘J.S. Reid and the Chillagoe Company’, in *Readings in North Queensland Mining History*, ed. K.H. Kennedy (Townsville, 1980), pp. 220-225, 230, 236, 242; see also Ruth Kerr, ‘John Moffat and the North Queensland Tinfilds’, in Kennedy, *Readings*, vol. 1, pp. 178-179; K.H. Kennedy, ‘“They Stumble That Run Fast:” In the Wake of the Chillagoe Company’, in Kennedy, *Readings*, pp. 190, 193, 217.

⁸⁶ Bridges, pp. 62, 74, 85-92, 94-96, 99, 102, 112, 116; Blainey, *Rush That Never Failed*, p. 153; B.F. Kennedy, ‘William Jamieson’, *Australian Dictionary of Biography*, vol. 9 (Melbourne, 1983), pp. 470-471; Trengrove, p. 14.

spectacular dividends'.⁸⁷ He made fortunes from B.H.P. and Mount Lyall, in Tasmania, of which he was also a director.⁸⁸

Later in 1888, despite the fact that the number of directors was limited to five,⁸⁹ a publication on mining companies in Australasia listed two additional ones, William Knox and Alexander Campbell.⁹⁰ Knox was also the company's first secretary, *pro tem*.⁹¹ A company promoter and secretary of many mining companies and the first secretary of B.H.P., a post he held for seven years, he later became a member of its board, being regarded as 'the brains behind' it.⁹² Like Campbell, he had left the board by November 1889. Assuming he was the Alexander Campbell of Melbourne who had 500 shares in 1890,⁹³ Campbell was not the leading Sydney businessman and politician, who, being 76 in 1888,⁹⁴ would have been too old to have played an active role, although his name would have tempted investors. This apparent director has not been traced.

The secretary, John Brandon, held 3,050 shares, presumably for his own benefit, as they were not listed as being held in trust for the company.⁹⁵ Patton had 3,000. Other shareholders whose careers can be traced include J.H. Fawcett, an assayer to B.H.P. and other Broken Hill

⁸⁷ Blainey, *Rush That Never Ended*, p. 221.

⁸⁸ Blainey, *Rush That Never Ended*, p. 275; Geoffrey Blainey, *The Peaks of Lyell*, 2 ed. (Melbourne, 1959), pp. 109-110, 183-184, 267.

⁸⁹ 'Memorandum of Association and Articles of Association of the Te Aroha Silver and Gold Mining Company' (Melbourne, 1888), p. 19, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

⁹⁰ Pulleine, p. 397.

⁹¹ 'Prospectus of the Te Aroha Silver and Gold Mining Company', *Te Aroha News*, 25 April 1888, p. 3.

⁹² Bridges, pp. 109, 122, 149; Blainey, *Rush That Never Ended*, p. 221; Blainey, *Peaks of Lyell*, pp. 55, 59-62, 70, 132, 146-151, 154, 168-169; Doreen Wheeler, 'William Knox', *Australian Dictionary of Biography*, vol. 9 (Melbourne, 1983), pp. 631-632; Trengrove, pp. 14, 30, 136.

⁹³ Share Register, 30 November 1889, Te Aroha Silver and Gold Mining Company, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

⁹⁴ Obituary, *Sydney Morning Herald*, 10 November 1894, p. 4; Terri McCormack, 'Alexander Campbell', *Australian Dictionary of Biography*, vol. 3: 1851-1890 (Melbourne, 1969), pp. 341-342.

⁹⁵ Share Register, 30 November 1889, Te Aroha Silver and Gold Mining Company, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

companies, and later a mining engineer based in Sydney.⁹⁶ Thomas S. and A. P. Horn, both of Adelaide, had 1,000 shares each. The former, a sharebroker, had sold the first shares in B.H.P. allotted to Adelaide; William Austin Horn, a mining magnate, pastoralist, politician, and eccentric,⁹⁷ who had no interests in Te Aroha, had been a provisional director of B.H.P. in 1885.⁹⁸ John Provis, an American mining engineer with experience of silver mines there, had reported to B.H.P. in 1886 on the best methods of treating its ore.⁹⁹ E.G. Brodribb, who had 1,900 shares, must be assumed to be a relative of Kenneth E. Brodribb, owner of Poolamacca Station, a provisional director when B.H.P. was floated; the latter was presumably the 'Kenric E. Brodribb' who owned a large sheep station near Broken Hill and who sold his shares in the Te Aroha company by November 1889.¹⁰⁰ Like Wilson, E.G. Brodribb was a prominent racehorse owner.¹⁰¹ C.P. (Frank) Dickenson of Broken Hill was correctly F.M. Dickenson, a member of the Melbourne Stock Exchange who was assistant secretary of B.H.P. from 1888 until replacing Knox as secretary in 1892 and holding the position until his death in 1923.¹⁰² C. and E. Millar of Melbourne jointly held 1,000; was the former Edward (later Sir Edward) Miller, one of the first Melbourne investors in B.H.P.¹⁰³ The 14 shareholders of the Broken Hill Mining Company formed in 1884 had included James G. Dalglish, the district surveyor based at Dubbo;¹⁰⁴ presumably he was related to Marie S., of Goulburn, New South Wales, who held 2,000. None of these people were naïve speculators tricked by unscrupulous vendors into wasting their capital; they thought they had a good investment, and expected to make a good return, possibly by parting with their shares at an appropriate time, as Samuel Wilson had done.

⁹⁶ Bridges, pp. 86, 112, 114; *Grey River Argus*, 3 July 1915, p. 5.

⁹⁷ See *Australian Dictionary of Biography*, vol. 9 (Melbourne, 1993), on Wikipedia.

⁹⁸ Bridges, pp. 105, 109.

⁹⁹ Bridges, pp. 143-144; Trengrove, p. 14.

¹⁰⁰ Bridges, pp. 74, 105, 181; Trengrove, pp. 9, 12, 23.

¹⁰¹ See *Te Aroha News*, 10 November 1888, p. 5; *Marlborough Express*, 25 October 1889, p. 2; *Otago Witness*, 16 January 1890, p. 28; *New Zealand Herald*, 12 April 1890, p. 5; *Observer*, 26 April 1890, p. 15.

¹⁰² Bridges, p. 196; Trengrove, pp. 20, 49; advertisements, *New Zealand Herald*, 2 November 1909, p. 1, 2 August 1912, p. 12, 12 October 1920, p. 10.

¹⁰³ Bridges, p. 121.

¹⁰⁴ Bridges, p. 74.

John Howell had 500 shares.¹⁰⁵ An American, he had a reputation as a 'mining engineer and metallurgist of considerable experience'; Wilson described him as 'one of the foremost Mining Engineers'.¹⁰⁶ According to a Sydney journalist visiting Waiorongomai, he had 'an enduring reputation for the success of every undertaking' in which he was involved.¹⁰⁷ Previously he had supervised the erection of reduction works in California, Nevada, Arizona, Colorado, Utah, Montana, and Mexico, and whilst in Wilson's employ continued to own 'extensive production works and mining property in Nevada'.¹⁰⁸ A Sydney newspaper claimed there was 'hardly a district through all the mining states in America' where Howell had 'not had something to do with the progress and success of gold and silver mining', especially in the treatment of 'base ores'.¹⁰⁹ He was experienced in mining, concentrating, and smelting.¹¹⁰

In July, a Melbourne correspondent wrote that 'the Te Aroha mine' had 'not yet commenced a boom on our local market' because speculators were 'just a little bit suspicious of New Zealand after the little affair in connection with the Sydney syndicate and the Auckland gold mines'.¹¹¹ This was a reference to a Sydney syndicate falsifying assays from its Maratoto mine.¹¹² Trading on the Melbourne Stock Exchange was rarely recorded in New Zealand newspapers, and the only details published were of sellers offering shares at 2s 6d in May 1889, at 7d two months later, and at 1s in October, when buyers offered 9d.¹¹³

THE COMPANY STARTS WORK

¹⁰⁵ Share Register, 30 November 1889, Te Aroha Silver and Gold Mining Company, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

¹⁰⁶ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 44; W.R. Wilson to Edwin Mitchelson, 6 January 1890, Mines Department, MD 1, 90/119, ANZ-W; *New Zealand Mining Handbook* (Wellington, 1906), p. 27.

¹⁰⁷ J.A.H., 'A Glance at Maoriland', *Evening News* (Sydney), 4 June 1889, p. 3.

¹⁰⁸ *Te Aroha News*, 14 November 1888, p. 2, 9 November 1889, p. 7.

¹⁰⁹ *Daily Telegraph* (Sydney), n.d., reprinted in *Te Aroha News*, 14 November 1888, p. 2.

¹¹⁰ Bridges, p. 176.

¹¹¹ Melbourne Correspondent, *Thames Advertiser*, 6 July 1888, p. 2.

¹¹² See *Auckland Weekly News*, 26 May 1888, p. 30, 2 June 1888, p. 36.

¹¹³ *Te Aroha News*, 18 May 1889, p. 2; *Thames Star*, 11 July 1889, p. 2, 16 October 1889, p. 2.

By October 1888, the company was paying £350 each week in wages. When improvements to the battery were completed that amount was anticipated to nearly double, for 300 men would be employed. A special reporter from Hamilton who recorded this fact anticipated benefits for the Waikato district:

The amount of money circulated by this company alone will make a wonderful difference to business men compared with the money which would have been in circulation had the mines not changed hands. There are, therefore, some very reasonable grounds for the hopeful view which residents there entertain of the future prosperity of the place as a goldfield. If the plant to be erected should prove as successful in treating refractory ores as it is claimed to be, mining in this district will undergo a complete revolution, the advantages of which can hardly be estimated. There will be a very large population of non-producers - of food - who will be consumers of our produce, and owing to the close connection with Waikato by rail our farmers will have a market practically at their doors.¹¹⁴

Immediately he purchased the properties, Wilson announced he would spend £20,000 in 'prospecting and opening up the mines', erecting new machinery, and extending the Wairakau water race. He ordered development of the New Find to resume and arranged for 40 tons of its ore and ten from the Silver King to be sent to the Adelaide smelting works 'in order that the necessary fluxes may be ascertained'.¹¹⁵ He authorized spending 'several thousand pounds' in thorough prospecting 'and opening up in a systematic manner', including 'several low level tunnels'.¹¹⁶ On 26 March, 40 men started work; by then tenders had been called that would require about another 30 miners.¹¹⁷ To drive four new tunnels, Adams employed all the available labour on five contracts employing 100 men, and it was anticipated that eventually 200 miners would be employed.¹¹⁸ Low levels in the New Find, Canadian, and Silver King were to be completed,

¹¹⁴ Special Reporter, *Waikato Times*, 11 October 1888, p. 3.

¹¹⁵ George Wilson to Under-Secretary, Mines Department, 4 April 1888, *AJHR*, 1888, C-6, pp. 11, 12.

¹¹⁶ *Te Aroha News*, editorial, 24 March 1888, p. 2, 7 April 1888, p. 2.

¹¹⁷ *Te Aroha News*, 28 March 1888, p. 2.

¹¹⁸ *Waikato Times*, 27 March 1888, p. 2; *Te Aroha News*, 28 March 1888, p. 2.

and winzes were begun to connect with the old levels.¹¹⁹ Although wages men did much of this work, a tender of £1,000 for driving a new low level was accepted.¹²⁰ In mid-April, a newspaper praised the company's 'energy'.¹²¹ Three months later, when reporting new plans for mining 'in a most extensive and vigorous manner', it wrote that the company meant 'business' and would either 'make a spoon or spoil a horn',¹²² meaning to 'make a determined effort to achieve something, whatever the cost'.¹²³

From April onwards, much prospecting was done, John Goldsworthy¹²⁴ leading a party of eight who mostly tested the Silver King reef.¹²⁵ When what was named Goldsworthy's reef was discovered in the former Army ground, a contract was let to drive 100 feet on it.¹²⁶ In May, 210 truckloads from other mines, possibly including some not owned by the company, were crushed for the 'excellent return of 275oz of melted gold'.¹²⁷ By July, the mining inspector reported that from 130 to 150 men were prospecting and mining.¹²⁸

Until the additions to the battery were completed, most mining would 'principally be confined to continuing the low levels' and 'generally speaking opening up the ground', meaning no additional miners would be employed.¹²⁹ The company was developing existing mines only, in a modest way, and, apart from Goldsworthy's prospecting, did little to open up new areas. By August, prospects were 'steadily improving', and the Colonist drive had struck 'grand dirt' in which gold showed freely. Goldsworthy and party continued their surface prospecting of the reef named after him, 'with very favourable results'.¹³⁰ By December, two shifts were driving on it.¹³¹

¹¹⁹ *Waikato Times*, 5 April 1888, p. 2.

¹²⁰ *Waikato Times*, 5 April 1888, p. 2, 14 April 1888, p. 2.

¹²¹ *Waikato Times*, 14 April 1888, p. 2.

¹²² *Waikato Times*, 17 July 1888, p. 2.

¹²³ *Oxford Dictionary of English Idioms*, ed. John Ayto (Oxford, 2010), p. 329.

¹²⁴ See paper on the Goldsworthy brothers.

¹²⁵ *Te Aroha News*, 21 April 1888, p. 2, 28 April 1888, p. 2, 12 May 1888, p. 2, 23 June 1888, p. 2.

¹²⁶ *Te Aroha News*, 23 June 1888, p. 2.

¹²⁷ *Te Aroha News*, 19 May 1888, p. 2.

¹²⁸ George Wilson to Warden, 2 July 1888, Inspector of Mines Letterbook 1888-1892, p. 52, YZAB 1240/1, ANZ-A.

¹²⁹ *Te Aroha News*, 1 August 1888, p. 2.

¹³⁰ *Te Aroha News*, 4 August 1888, p. 2.

Clearly, therefore, the report in an Auckland newspaper in October that, because the battery was being reconstructed, 'very little quartz' was being sent down and only four men were mining,¹³² must have referred to the number of independent miners working on the field.

In mid-December there was 'little doing on the hill', but work would start 'in some of the mines in about ten days or a fortnight', and by the middle of January Howell expected 'to have a large number of hands employed in the mines'.¹³³ Howell forecast that there would be from 200 to 300 miners at work in early January 1889; although precise figures were not given, 'almost every day' additional miners were being employed then.¹³⁴ In late January a contract was let to extend the Canadian level in the New Find.¹³⁵ The weather prevented stoping out ore: 'generally speaking' little mining was being done 'as crushing operations have been retarded owing to the great scarcity of water' leaving all the battery hoppers full.¹³⁶ Early in February, mining was 'looking lively, both hoppers (New Find) being about full', and it was expected a couple of hundred trucks would be sent down each week 'before very long'.¹³⁷ In the first months of 1889, 216 men were employed, a total including battery hands and those rebuilding the battery.¹³⁸ By mid-1889 the company had driven 1,903 feet, and before work was suspended another 369 feet was driven on various reefs and some New Find and Colonist ore stoped out.¹³⁹ In June, when most of the reconstructed battery was at work, regular supplies of quartz were being sent down, the Canadian tunnel was being driven towards the

¹³¹ *Te Aroha News*, 22 December 1888, p. 2.

¹³² *Auckland Weekly News*, 27 October 1888, p. 37.

¹³³ *Te Aroha News*, 15 December 1888, p. 2, 22 December 1888, p. 2.

¹³⁴ *Waikato Times*, 18 December 1888, p. 2, Waiorongomai Correspondent, 10 January 1889, p. 2.

¹³⁵ *Te Aroha News*, 26 January 1889, p. 2.

¹³⁶ Waiorongomai Correspondent, *Te Aroha News*, 26 January 1889, p. 2.

¹³⁷ Waiorongomai Correspondent, *Te Aroha News*, 6 February 1889, p. 2.

¹³⁸ George Wilson to Under-Secretary, Mines Department, 25 April 1889, *AJHR*, 1889, C-2, p. 101.

¹³⁹ George Wilson to Under-Secretary, Mines Department, 25 April 1889, *AJHR*, 1889, C-2, p. 101; H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 43; H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 149.

reef in the New Find, and a prospecting drive had been started in the Canadian.¹⁴⁰

Although the *Te Aroha News* later noted, correctly, that ‘systematic work done on the hill was extremely limited and confined to a couple of mines’,¹⁴¹ by June 1889 several men were prospecting between the top of the ranges and the Waitawheta Valley, tracing the main reef northwards in the hope of discovering its junction with the Champion reef, above the Tui mines. ‘This most important work’ was being ‘carried on with considerable difficulty owing to the great amount of undergrowth, and depth of surface soil met with’.¹⁴² This prospecting beyond the company’s ground was because Howell had taken two directors, Jamieson and Clark, to inspect the area between Waiorongomai and Tui. Howell had been ‘well pleased with what he saw, and was very favourably impressed with the class of country’.¹⁴³

CREATING THE BEST BATTERY IN AUSTRALASIA

Wilson stated that there was ‘no intention of removing’ Adams as manager, although the new owners would send ‘a skilled expert’ to ‘inspect and advise us’.¹⁴⁴ After he cabled to America seeking the services of a skilled metallurgist to work for both B.H.P. and the Te Aroha Silver and Gold Mining Company, Howell agreed to visit Waiorongomai and Australia ‘for a brief period’. He was ‘the patentee of the White and Howell Revolving Roaster’ which Adams had recently added to the battery.¹⁴⁵ His arrival in mid-1888 was awaited with great enthusiasm, a correspondent writing that the current vitality in mining was ‘mere child’s play to the revival anticipated when Howell, the celebrated California expert, comes on the scene’. In readiness for his inspection, ‘the battery, furnace, and all appliances relating thereto’ were ‘arranged and cleaned up’.¹⁴⁶

¹⁴⁰ *Te Aroha News*, 5 June 1889, p. 2.

¹⁴¹ Editorial, *Te Aroha News*, 20 July 1895, p. 2.

¹⁴² *Te Aroha News*, 5 June 1889, p. 2, 15 June 1889, p. 2.

¹⁴³ *Te Aroha News*, 20 April 1889, p. 2.

¹⁴⁴ *New Zealand Herald*, 23 March 1888, p. 5.

¹⁴⁵ *Te Aroha News*, 19 May 1888, p. 2.

¹⁴⁶ Waiorongomai Correspondent, *Waikato Times*, 14 June 1888, p. 2.

Howell stayed with Adams, and together they inspected the mill and mines.¹⁴⁷ His task was to determine what machinery to install, not to ascertain the extent and value of the ore.¹⁴⁸ To test the 'character and composition of the ores' and their 'concentrating qualities', he erected the first vanner at Waiorongomai, which was stated to work successfully. Presumably it was at his suggestion that the treatment of tailings was altered:

Formerly, as soon as the tailings came from the roaster, they were cooled by a spray of water before being treated in the berdans. Now the sand, after leaving the roaster, is spread on the concrete floor, there allowed to cool naturally, thus getting rid of sulphur and any other noxious gases that are considered so deleterious in the matter of gold-saving.¹⁴⁹

Howell spent five weeks making experiments as well as investigating a rival treatment proposed by Alexander Parkes,¹⁵⁰ an English engineer.¹⁵¹ The *Te Aroha News* noted an earlier potential investor's suggestion that the galena in the Tui ore, useful as fluxes, could be brought from there 'by a light tramway along the side of the ranges'; it 'would in no way surprise us' if Wilson bought a large interest in the Tui mines.¹⁵² He did not, but Tui ore was trialed as fluxes. Although it had been intended that Howell would be accompanied by three of the directors, Clark, McGregor, and Jamieson, only Clark came.¹⁵³ He and Wilson spent nearly two weeks in early July inspecting the mines and battery and consulting with Howell. Although the 'varied and exhaustive' experiments, first commenced 'on a small scale' by Adams before Wilson first visited the district and continued 'on a much larger scale' before Howell arrived,¹⁵⁴ were not completed, they were 'sufficiently advanced' to enable Howell to state that the low grade ores could 'be treated to advantage by concentrating and smelting':

¹⁴⁷ *Te Aroha News*, 27 June 1888, p. 2.

¹⁴⁸ *Te Aroha News*, 9 November 1889, p. 7.

¹⁴⁹ *Waikato Times*, 7 June 1888, p. 2.

¹⁵⁰ *Te Aroha News*, 30 June 1888, p. 2, 21 July 1888, p. 2, 28 July 1888, p. 2, 8 August 1888, p. 2.

¹⁵¹ See paper on the Tui district.

¹⁵² Editorial, *Te Aroha News*, 23 June 1888, p. 2.

¹⁵³ *Te Aroha News*, 9 June 1888, p. 2, 1 September 1888, p. 2.

¹⁵⁴ *Te Aroha News*, 1 September 1888, p. 2.

As soon as the more exact experiments are finished, Mr Howell will report on the plant required, and it will be put in hand at once; in fact, some machinery which will be necessary in any case has already been ordered. Mr Howell has quite convinced Messrs Wilson and Clark that low-grade ores, which will assay £4 per ton, can be mined and treated at a profit of 30s per ton, and there is a large quantity of ore of this class, which has hitherto been valueless, available.

Some 5-ton samples were being processed in the battery to enable Howell to 'report accurately on what can be done with the ores. The concentrates will also be analyzed for lead and iron, to ascertain how far they will be available as fluxes'. Howell spoke 'very confidently of the ores', anticipating that 'by judicious treatment' by the 'appliances' he recommended they would 'yield large and profitable returns' and the property would 'prove of great value'.¹⁵⁵ An Auckland chemist, James Alexander Pond,¹⁵⁶ who assisted his experiments, claimed the company was making 'strides' in determining the process to use.¹⁵⁷ Concentration was 'carried on night and day with one of Hendy's patent "Triumph" concentrators, capable of treating about seven tons per day', and a second one was erected.¹⁵⁸ Wilson declared himself 'well satisfied' after tests showed that the ore could be treated 'by a combined process (to include smelting)'.¹⁵⁹ Smelting only the concentrates meant an 'enormous saving in fluxes and fuel', and the 'essential portion of the ore' would be retained, 'the troublesome portion, silica', being 'allowed to run off'.¹⁶⁰ Others associated with the tests were also satisfied: Frederick Douglas Brown, Professor of Chemistry at Auckland University College,¹⁶¹ informed the Minister of Mines that the experiments had shown the ore to be 'very easily

¹⁵⁵ *New Zealand Herald*, 10 July 1888, p. 5.

¹⁵⁶ See paper on his life.

¹⁵⁷ *Te Aroha News*, 1 September 1888, p. 2; *Auckland Weekly News*, 27 October 1888, p. 36.

¹⁵⁸ *Te Aroha News*, 7 July 1888, p. 2.

¹⁵⁹ *Te Aroha News*, 11 July 1888, p. 2; see also 14 July 1888, p. 2.

¹⁶⁰ *Waikato Times*, 7 July 1888, p. 2.

¹⁶¹ See *Cyclopedia of New Zealand*, vol. 2, p199.

concentrated and that the concentrates may be smelted without difficulty'.¹⁶²

Once the final tests had been completed, very full details of the new machinery 'of a very complete character' to be erected 'on a most extensive scale' were provided by Adams, who supervised the construction of the extensions to the battery and the water race. The plant would be able to 'profitably and satisfactorily treat' any refractory Hauraki ores 'not amenable to the ordinary methods', and the new machinery would enable the purchase of ore 'in any quantities' for cash, 'on a sliding scale of prices, according to assay value'. The existing plant consisted of 'a battery of forty head of stampers, and a tailings plant, some ten chains off, containing fifty-two berdans; also, a White-Howell revolving roasting furnace, etc'. In the new plant, after 'being classified, ore would be treated in the manner most suited to its character'.¹⁶³

The first step was to reduce the size of the ore. Quartz was 'discharged direct from the trucks on to the "grizzlies" or gratings, the bars of which are fixed 2in apart, and all ore sufficiently small, drops through into hoppers and is fed from thence direct into the stamper-boxes by means of automatic self-feeders'.¹⁶⁴ Course ore that could not go through the gratings went to three large stone breakers operating 'on the Blake-Marsden principle',¹⁶⁵ which reduced the size until it went through the gratings. The stone breakers were 'driven from a line-shaft by means of an independent Pelton wheel of thirty-horse power', capable of breaking 50 tons every 24 hours.¹⁶⁶ The first two, used with the existing 40 head of stampers, were placed at the rear (or tramway side) of the battery, about ten feet below where the tramway ended at the hoppers. They were 'erected as it were in the hoppers', so that the ore passed directly 'through the stone-breakers into the hoppers' and then fed automatically to the stampers.¹⁶⁷

¹⁶² Fred Brown to Minister of Mines, 28 July 1888, Mines Department, MD 1, 89/843, ANZ-W.

¹⁶³ *Te Aroha News*, 1 September 1888, p. 2.

¹⁶⁴ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 136.

¹⁶⁵ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 44.

¹⁶⁶ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 136.

¹⁶⁷ *Te Aroha News*, 1 September 1888, p. 2.

A fourth, smaller, stone breaker was used in the sampling house to reduce 'ore sent to the company to purchase, so that the obtaining of a fair sample may be ensured for assay purposes'. This sampling house would have

a set of corrugated rolls, which will still further reduce the ore, after it has been passed through the stone breaker, to the size of say small nuts. After the ore has been reduced by these rolls it will be conveyed by means of an elevator to the upper floors of the sampling house, and as it passes up a sample will be discharged automatically into a receptacle provided to receive it. By this means a fair sample of the ore will be ensured, and it will be upon the result obtained from the assay of these samples that the price to be paid for the ore submitted for sale will be decided.¹⁶⁸

Ore not being sampled fell into a bin supplying the 'automatic self-feeding machines' by gravitation.¹⁶⁹ Each five heads of stamps was fed by a Challenge ore-feeder, which could be regulated to ensure there was 'always a uniform quantity of ore in the stamp-mortars'.¹⁷⁰ Of the 60 heads of stamps, 40 were 'of the pattern generally used'. Each stamp weighed 'about 850lb. The stamps of the old pattern have a drop of about 10in, and generally run at about sixty-five strokes per minute'. Howell said these stamps could crush 'only about 40 tons per day, or about 1 ton to each stamp', which to Henry Andrew Gordon, the inspecting engineer for the Mines Department, was 'a small average, considering that the quartz has been through the rock-breaker'. He recognized that Howell was comparing them with the capacity of a battery he had constructed 'on the American principle' using stamps he had patented, but believed the difference was not as great as Howell claimed.¹⁷¹ The 20 stamps installed by Howell had the same weight as the earlier ones, falling seven and a half inches at a speed of 95 strokes per minute.¹⁷² The warden was told that 'as much as 50 tons' could be treated daily, and their 'steel cams and steel tappets (or discs)', along with the 'manner of construction, were 'an immense improvement on the old style. By a very ingenious arrangement any one of these stampers,

¹⁶⁸ *Te Aroha News*, 1 September 1888, p. 2.

¹⁶⁹ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 43.

¹⁷⁰ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 44.

¹⁷¹ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, pp. 43-44.

¹⁷² H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

or any desired number of them, can be hung up without altering the speed in any way or stopping the battery', a great improvement on the old method batteries. Now 'a boy, with a piece of stick made for the purpose, can connect or disconnect any one or more with ease'. Each 30-head of stampers was driven by a 50-horsepower Pelton wheel.¹⁷³

From the stampers, the 'pulverized material' was 'forced through the gratings' to pass 'directly over quicksilvered-copper plates' about four feet in length, upon which most of the free gold was said to be retained, which Gordon considered 'very doubtful' because it depended 'on conditions to a great extent'. The 'coarser particles, and all the sulphides containing either gold or silver', after 'escaping over those copper plates' were 'conveyed direct to the concentrating plant through iron pipes by means of a current of water. The gold and silver caught on the plates' was 'cleaned up at intervals and treated in the ordinary way'.¹⁷⁴

The number of holes in the gratings was significant, as the local director, Clark, later explained. 'In America fine gratings had gradually been introduced in the stamp mills; they were frequently now used as fine as 1,600 holes to the square inch, and sometimes even 2,500 holes', whereas New Zealand's comparatively coarse gratings seldom exceeded 200 holes. Upon his arrival, Howell 'condemned the coarse gratings in use, and imported and fitted into some of the boxes much finer gratings. He did not remember the exact figures, but in the case of some low-grade fairly free-milling ore, the yield was increased about 50 per cent'.¹⁷⁵

Adams stated that 'an important part' of the new plant consisted of 'Frue concentrators, the value of which has been amply demonstrated in connection with the series of experiments' they carried out. He planned to erect 25 Frue concentrators 'to separate the refractory portions' of the ore.¹⁷⁶ They were 'fixed in two rows immediately in front of the stampers' and were 'driven by two line-shafts, the power being furnished by a double 3ft Pelton

¹⁷³ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 136.

¹⁷⁴ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

¹⁷⁵ J.M. Clark, contribution to discussion of George J. Binns, 'Mining in New Zealand', *Transactions of the Federated Mining Engineers*, vol. 3 (1891-1892), p. 670.

¹⁷⁶ *Te Aroha News*, 1 September 1888, p. 2.

wheel of forty-horse power'.¹⁷⁷ Gordon called the concentrators vanners, and reported that only 20 were installed:

The concentrators perform a most important work – namely, the separation of all base sulphides from the valueless quartz and gangue; and this result is attained by means of a simple arrangement, giving a lateral and side motion to the machines. Each machine is provided with an endless indiarubber belt 3ft 6in wide and 28ft long, over which the pulverized material passes. The belt has an inclination of about 8in to 12ft, and travels at the rate of about 2ft per minute, while the vibratory motions sideways are about 200 per minute. The crushed material, as it is discharged from the pipe that conveys it from the copper-plated tables, drops on to the concentrator distributor, which distributes the material evenly across the whole width of the belt as it moves round. A spray of water from a perforated pipe is continually playing on the ore as it falls on the belt, and washes away the light particles, which are termed tailings, while the uphill travel of the belt against the stream carries over the denser metallic grains into a receiver underneath which is filled with water. The travel of the belt through this receiver washes all the particles off it, and leaves it clean to receive a fresh deposit as it comes round on top again.¹⁷⁸

Adams described the revolving furnace as 'very similar to the White-Howell revolving furnace' in the old plant. All ore assaying as having over 40 per cent 'of refractory substances' went directly from the stone breakers to the 'revolving roaster' before receiving the same treatment as the concentrates.¹⁷⁹ Gordon provided more detail:

These concentrates are removed from the receivers underneath the vanners, and fed into an elevator which discharges them direct into a Howell patent revolving-cylinder furnace, 5ft in diameter at the widest end. This furnace revolves at a speed of five revolutions per minute, and has an inclination from the feed-to the discharge-end of 6in, the length of the furnace being 24ft. The result attained by passing the concentrates through this furnace is that fully 90 per cent of the sulphur, together with all

¹⁷⁷ H.A. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 137.

¹⁷⁸ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

¹⁷⁹ *Te Aroha News*, 1 September 1888, p. 2.

other volatile matter, is driven off by the action of the heat and atmospheric air passing through the furnace.¹⁸⁰

Adams explained that the ore passed directly from the revolving furnace into an adjoining reverberatory furnace 40 feet long and ten feet wide, whose 'great heat' caused the ore to partly melt into 'a kind of matte'.¹⁸¹ Gordon described this furnace as a 'reverberatory or slagging' one, the concentrates being 'mixed with a percentage of lead-ores' and roasted by a combination of wood and coal. 'The revolving cylinder-furnace' could treat 40 tons every 24 hours, and the 'slagging furnace' half that quantity in that time.¹⁸² He gave the dimensions of the revolving furnace as 44 feet long, 'having a depth of 20in from the crown of the arch to the hearth'; its hearth was 'truly horizontal'. The concentrates were 'worked from the back end towards the furnace with long iron slices or rakes, through the small doors in the side, by manual labour, and by the time it gets to the furnace-end it is in a claggy matte or slag without being smelted'. The 'semi-fused condition' of the matte was 'necessary for the final treatment in the smelting-furnace'.¹⁸³

While the matte cooled, the air so oxidized it that it crumbled into pieces; once cooled, it went 'by tramway to the wet jacket smelting furnace' for final treatment.¹⁸⁴ Gordon explained that this stage of the process commenced with the 'slagged ore' being dumped by the tramway trucks onto 'the feeding and mixing floor, immediately above the furnace', where it was 'mixed with the necessary fluxes – such as limestone, iron-ore, iron-filings, lead, &c', before being fed into a blast furnace 'in layers with coke fuel':

The blast for the furnace is supplied by a Baker's No. 4 1/2 blower, having six air-pipes, into the side of the furnace, driven by a Pelton water-wheel of about fifteen-horse power. The ore passing in through the smelter is subjected to a heat of about 4,000° Fahr., which reduces the whole of the contents of the furnace to a thin fluid. By the action of this intense heat the gold, silver, and lead are completely liberated from the ore, and, from chemical affinity and by their specific gravity, combine together

¹⁸⁰ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

¹⁸¹ *Te Aroha News*, 1 September 1888, p. 2.

¹⁸² H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

¹⁸³ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 44.

¹⁸⁴ *Te Aroha News*. 1 September 1888, p. 2.

and sink down through the molten liquid into the bottom of the furnace, known as the lead-well. The contents of the well are dipped out at intervals by means of ladles. The well here referred to is outside the furnace, and connected with the bath in the bottom of the furnace, and shows the height of the molten metal. The metal is taken from this well and poured into moulds, from which it is subsequently turned out in the form of bar-bullion, and stacked ready for shipment to the refineries. There is an opening in the water-jacket above the lead-well, which is stopped up, but is tapped at intervals to allow the residue or waste substance to run into slag-pots, where it is allowed to cool before being turned out.¹⁸⁵

The lead, silver, and gold sank to the bottom while the copper floated on the top because the amount of sulphur in it meant it separated easily from the lead. This regulus was shipped to England for treatment, where the precious metals were extracted from the 'lead-bullion' by 'the zinc-desilverisation process'.¹⁸⁶

It was 'not essential that all ores should be concentrated prior to smelting', as some ore was 'suitable to be mixed with the necessary fluxes and fed direct into the furnace' and smelted. The 'general run of ore mined at Waiorongomai' was suitable for concentration and was 'more cheaply treated by this method'. The water-jacket furnace could smelt 'from 20 to 30 tons per day, exclusive of fuel and fluxes, the quantity varying according to the character of the ore'.¹⁸⁷

The residue left after the concentrates had been separated from the pulverized ore was conveyed automatically by sluice boxes 'direct from the concentrators to the existing tailing plant', where a portion was put through berdans whilst the remainder were treated by 'a Boss Continuous Pan Plant'.¹⁸⁸ This also treated ore that could not 'be satisfactorily dealt with by means of crushing and concentration, &c'.¹⁸⁹ This plant contained 'three grinding pans, each three feet six inches in diameter; six do., each five feet six inches in diameter; three settlers, each eight feet in diameter; and one

¹⁸⁵ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

¹⁸⁶ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 44.

¹⁸⁷ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

¹⁸⁸ *Te Aroha News*, 1 September 1888, p. 2.

¹⁸⁹ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

“clean-up” pan, four feet in diameter’, all driven by six Pelton wheels.¹⁹⁰ After the tailings from the Frue vanners were ground in the three Boss pans, revolving 65 times per minute, the pulp went into ‘the Boss combination amalgamating-pans’, revolving 70 times per minute. Each of these was ‘charged with 300lb of quicksilver’, and after the amalgamation was completed the material was ‘run out into settlers - there being one settler to every two amalgamating-pans - and the quicksilver and amalgam collected’.¹⁹¹ About 30 tons could be treated each day.¹⁹²

The existing tramway to the battery hopper was extended 30 feet southwards ‘to connect with the third stone-breaker, required for the additional twenty head of stampers’. The latter required a building 83 feet by 58 feet, extending the existing one to the south and containing the new revolving roasting furnace and the reverberatory furnace. On the western side of the new building was the sampling house, 30 feet by 20 feet, with several floors. ‘The mixing floor’, erected to its east, was 80 feet by 80. A 50-foot-high brick chimney was required for the new furnaces. The smelter, erected on the southern side of the existing tailings plant, required a building 30 feet by 30 feet and a chimney 50 feet high; it could treat 30 tons every 24 hours. The existing tramway linking the battery with the tailings plant was connected with each end of the new plant by ‘short branch lines’. The Boss mill was erected on the southern side of the tailings plant in a building 30 feet by 76 feet.¹⁹³

The company’s offices contained ‘a very complete assaying plant, etc’, and the plant could treat 100 tons every 24 hours, at a cost of 3s per ton.¹⁹⁴ Price Bros of Thames manufactured most of the machinery,¹⁹⁵ but the Frue concentrators were imported. All the buildings were ‘lit with electricity, which has been found to work so satisfactorily since its introduction into the

¹⁹⁰ *Te Aroha News*, 1 September 1888, p. 2.

¹⁹¹ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, pp. 44-45.

¹⁹² H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

¹⁹³ *Te Aroha News*, 1 September 1888, p. 2.

¹⁹⁴ *Te Aroha News*, 1 September 1888, p. 2; H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

¹⁹⁵ For details of the machinery constructed by this company, see in particular A. & G. Price, Letterbook 1888-1889, pp. 32, 33, 77-80, 117-119, 142-144, 183, 209-211, 296, 404, 408-409, 444, 460-461, 540-541, 707-708, 710, A. & G. Price Archives, Thames; *Te Aroha News*, 18 August 1888, p. 2, 22 September 1888, p. 2.

existing battery and tailings plant'.¹⁹⁶ Adams designed a double Pelton wheel 'in order that the speed may be as steady and regular as possible for driving the concentrators'.¹⁹⁷ Gordon noted that although the 'large quantity of silica' in the ore made it unsuitable for smelting, this plant coped 'by getting clear of most of the silica on the concentrating-tables, and only dealing with a small percentage of it in the material that goes into the smelting-furnace'. The large plant meant 'the whole of the lodes', even those containing low-grade ore, could be profitably worked; no other plant erected in Australasia was capable of treating this refractory ore 'with the same probability of success'.¹⁹⁸

To ensure a sufficient supply of water throughout the year, the water race was being extended 'about four miles' to Wairakau Creek.¹⁹⁹ Two gullies it crossed were 'about eighty feet deep, and about six hundred feet wide (the two)', and 'several small gullies' were crossed using wrought iron pipes.²⁰⁰ Landslips on the Battery Company's water race had backed up water 'for a considerable distance, and eventually it carried the race away'; this portion was now flumed.²⁰¹ A lake near the Tuahu Track, from Wairakau to Katikati, was surveyed in preparation for tapping it,²⁰² but was not used. Another water race was applied for to run from Diamond Gully Creek, picking up water from others, especially from Army Creek.²⁰³

Estimates of the cost of these developments were from £20,000 to £40,000.²⁰⁴ In January 1890 Wilson estimated it at nearly £20,000, but a month later Gordon used company records to give the correct amount, £22,780.²⁰⁵ This comprised £15,599 for plant and machinery generally,

¹⁹⁶ *Te Aroha News*, 1 September 1888, p. 2.

¹⁹⁷ *Te Aroha News*, 13 October 1888, p. 2.

¹⁹⁸ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 45.

¹⁹⁹ *Te Aroha News*, 1 September 1888, p. 2.

²⁰⁰ *Te Aroha News*, 12 January 1889, p. 2.

²⁰¹ Waiorongomai Correspondent, *Te Aroha News*, 6 February 1889, p. 2.

²⁰² 'Old Miner', 'The Waiorongomai Goldfield', *Te Aroha News*, 4 February 1911, p. 1.

²⁰³ 'Sketch Plan of Water Race Applied for by John Howell', n.d., Te Aroha Warden's Court, General Correspondence 1883 [!], BBAV 11584/2a, ANZ-A.

²⁰⁴ *Te Aroha News*, 1 September 1888, p. 2, 27 April 1889, p. 2; 'Aboriginal', 'General Notes', *Thames Advertiser*, 8 May 1891, p. 2; *Waikato Times*, 10 November 1888, p. 2.

²⁰⁵ W.R. Wilson to Edwin Mitchelson, 6 January 1890; H.A. Gordon to Under-Secretary, Mines Department, 24 February 1890, Mines Department, MD 1, 90/119, ANZ-W.

£3,248 for the concentrating plant, £1,788 for repairs to the tramway, and £2,145 for repairing and extending the water races. In addition there was the original purchase price to add before the company received any return.²⁰⁶ At least the battery was cheap to operate, requiring only two men and three boys per shift.²⁰⁷

Howell assured Wilson there was 'no doubt' his plant was 'the most extensive of the kind in the Colonies' and 'furnished throughout with the latest improved ore dressing and reducing machinery, by which the most refractory Gold, Silver, Lead, and Copper ores can be successfully manipulated'.²⁰⁸ His purchase of 500 shares indicated that he expected it to succeed.²⁰⁹ When they inspected the completed battery, Wilson and his brother were pleased: it was 'by far the most complete combination plant in the whole of the Australasian Colonies, and reflected the greatest credit' on Howell.²¹⁰ When 'many people' told a visiting reporter in October 1888 that there would 'never be enough gold found there to pay expenses' he responded that 'the same has been said of every goldfield that has ever been worked in the Australasian colonies'.²¹¹ No other such doubts were recorded, and 'belief in the success of the gold-saving appliances' was 'by no means confined to the promoters and owners of the mines, for everyone I questioned about the matter expressed his firm belief in them also'.²¹² As the first 'combination plant' in New Zealand, meaning that it could treat all types of ore, its erection would be 'the means of revolutionizing mining', the local newspaper anticipated.²¹³ 'The importance of these works, not only to the district more immediately concerned, but also to the Colony as a whole', could 'scarcely be over-estimated'. Should the plant do all its owners appeared 'fully satisfied' it would do, it meant 'the inaugurating of a new era of prosperity to the whole goldfield', enabling 'many mines to be profitably worked, that without some such plant, would necessarily remain

²⁰⁶ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 43.

²⁰⁷ *Te Aroha News*, 9 November 1889, p. 2.

²⁰⁸ John Howell and W.H. Patton to W.R. Wilson, 13 December 1889, Mines Department, MD 1, 90/119, ANZ-W.

²⁰⁹ Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

²¹⁰ *Te Aroha News*, 8 January 1890, p. 2.

²¹¹ Special Reporter, 'Te Aroha and Waiorongomai', *Waikato Times*, 11 October 1888, p. 3.

²¹² Special Reporter, 'Te Aroha and Waiorongomai', *Waikato Times*, 4 October 1888, p. 2.

²¹³ Editorial, *Te Aroha News*, 1 September 1888, p. 2.

undeveloped'.²¹⁴ Even ore from Australia might be treated. Howell was 'sanguine of being able to treat at a profit ores of a grade that would not pay under any other treatment'.²¹⁵

This enthusiasm was widely shared. Gordon described it as 'the most complete reduction-works in the whole of the Australasian Colonies' and 'likely to be able to deal with all descriptions and characters of ore found on this field'.²¹⁶ J.A.H., in 'A Glance at Maoriland' published in the Sydney *Evening News*, wrote that this 'most complete, most perfect, and ... most extensive' plant could 'revolutionize the mining industry in the southern hemisphere'.²¹⁷

In late November 1888, Howell returned to Waiorongomai. A rumour that he had been appointed to manage the plant was at first considered 'very unlikely', for once it was operating he would want to return to America, where he had 'extensive works of his own to look after'.²¹⁸ However, on 1 December he did replace Adams as general superintendent;²¹⁹ Adams' responded by resigning, as did Hugh McLiver, the mine manager.²²⁰ These sudden changes, 'which a few weeks ago were not even contemplated', formed 'the principal topic of conversation at Waiorongomai', people 'often' asking 'what will be the next change?'²²¹ McLiver was replaced as 'general mine manager' by John Goldsworthy,²²² while Howell supervised the completion of the battery.²²³

Any ill feeling between Adams and Howell either did not exist or was transitory, for nine months later they jointly inspected mines at Waitekauri.²²⁴ Howell was interested in other mining areas, and in May 1889 it was believed that he would erect a plant based on 'his system' at

²¹⁴ Editorial, *Te Aroha News*, 20 October 1888, p. 2.

²¹⁵ J.A.H., 'A Glance at Maoriland', *Evening News*, 4 June 1889, p. 3.

²¹⁶ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 43.

²¹⁷ J.A.H., 'A Glance at Maoriland', *Evening News*, 4 June 1889, p. 3.

²¹⁸ Waiorongomai Correspondent, *Waikato Times*, 29 November 1888, p. 2.

²¹⁹ *Waikato Times*, 4 December 1888, p. 2.

²²⁰ See paper on the New Find mine.

²²¹ *Te Aroha News*, 8 December 1888, p. 2.

²²² *Te Aroha News*, 15 December 1888, p. 2.

²²³ *Te Aroha News*, 15 December 1888, p. 2.

²²⁴ *Waikato Times*, 7 September 1889, p. 3.

Waihi.²²⁵ In that September the Waihi Company was erecting a battery ‘on the same principle’.²²⁶ At the end of the year, a Thames syndicate asked him to provide ‘plans and specifications for a ten-head battery for dry or wet crushing in connection with concentrating machinery’.²²⁷ However, according to the *Te Aroha News*, most mine and battery managers were not convinced of the benefits of concentrating their ore and sending the concentrates for further treatment at Waiorongomai because of ‘a great and unaccountable dislike’ of changing ‘from the old method’. ‘On several occasions when at Thames’, Howell told them the advantages of concentrating,

in fact offering to send a couple of concentrators to the Thames for a time, and supervise their erection, so as to practically demonstrate the benefits derivable from their use; but his offer was not accepted, so strongly rooted are old-time prejudices against what some are pleased to term “new fangled notions.”²²⁸

Completing the battery took a long time. In December 1888, Howell bought ore and fluxes from the Tui mines and the unsuccessful plants erected at Karangahake by LaMonte and Parkes.²²⁹ Plans were made for further additions, as it was ‘capable of being enlarged to double or treble the present size’.²³⁰ Twenty stampers were to be ‘constructed on a greatly improved principle, work at a far greater speed, and be capable of reducing a far larger quantity of quartz per day’ than with the old ones.²³¹ When Jamieson visited in April, after ‘a careful inspection of the mine, and of the company’s prospects’, he concluded that ‘the outlook for the shareholders is very fair indeed’. The nearly completed plant was ‘the right sort for the reduction of all the sulphide ores found in the Thames, Te Aroha, and the Karangahake districts; and the company hope in a short time to be able to go in extensively for purchasing ores from the surrounding districts’. As the

²²⁵ *Waikato Times*, 23 May 1889, p. 2.

²²⁶ *Waikato Times*, 7 September 1889, p. 3.

²²⁷ *Te Aroha News*, 16 November 1889, p. 2.

²²⁸ Editorial, *Te Aroha News*, 9 November 1889, p. 2.

²²⁹ *Te Aroha News*, 15 December 1888, p. 2, 9 March 1889, p. 2; *Waikato Times*, 9 February 1889, p. 2.

²³⁰ *Te Aroha News*, 4 May 1889, p. 2.

²³¹ *Te Aroha News*, 20 April 1889, p. 2.

supply of lead ore for smelting was ‘rather small’, obtaining this from Australia was being considered.²³²

On 1 May 1889, the Minister of Public Works, Edwin Mitchelson, who had invested in a very small way in Waiorongomai and from 1888 to the 1930s invested in Tui mines,²³³ inspected the partially rebuilt plant. His party was shown ore being crushed, concentrated, and reduced, the valuable portion, about one-twentieth, being separated from the rest of the particles. ‘The simple, rapid, and efficient way in which these machines accomplished the end in view’ was ‘watched with very great interest’. The remaining machinery was inspected, the process was explained, ‘and the large sampling works (yet to be erected) described’, after which the tailings plant was viewed. ‘The wet jacket smelting process (now almost completed) was then inspected’, followed by the assay works ‘and very complete laboratory’. Their guides answered ‘queries of every conceivable kind’.²³⁴

By June, most of the battery was working, and extra carpenters were employed to erect the additional 20 stampers.²³⁵ As bricks in the cylinder furnace in the tailings plant were continually falling out, Howell was forced to replace them with an improved design.²³⁶ By late June, the battery was operating in three shifts using 35 stampers.²³⁷ A month later, the extra 20 stampers were given a trial, using stamp-mortars patented by Howell in America.²³⁸ They worked ‘most satisfactorily and smoothly up to a speed of 95 to a hundred strokes per minute’, and were ‘in every way a great

²³² *New Zealand Herald*, 14 April 1889, p. 5.

²³³ For his shareholding in Silver King Licensed Holding at Waiorongomai, see *Te Aroha News*, 24 March 1888, p. 2; for his involvement in Tui mining in the 1880s and 1890s and the 1920s and 1930s, see for example *Te Aroha News*, 17 November 1888, p. 2, 12 June 1933, p. 1; Te Aroha Warden’s Court, Mining Applications 1896, 101, 102/1896, BBAV 11582/4a; Register of Applications 1921-1934, hearing of 13 December 1926, BBAV 11505/6b; Record Book 1899-1946, hearing of 8 June 1933, BBAV 11547/1b; Mining Applications 1933, 1/1933, BCDG 11289/2a, ANZ-A.

²³⁴ Waiorongomai Correspondent, *Te Aroha News*, 4 May 1889, p. 2.

²³⁵ *Te Aroha News*, 5 June 1889, p. 2.

²³⁶ Waiorongomai Correspondent, *Te Aroha News*, 19 June 1889, p. 2.

²³⁷ *Te Aroha News*, 22 June 1889, p. 2.

²³⁸ Waiorongomai Correspondent, *Te Aroha News*, 27 July 1889, p. 2; H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

improvement on the old style of stamper'.²³⁹ The smelting furnace was expected to be 'in blast within a month'. Lead ore flux from Broken Hill was due to arrive shortly, and the road to the rear of the battery was being improved 'to facilitate the carting of the flux, coal, etc, which will be delivered at this part of the works and thence be conveyed direct by tram to the Tailings Plant, where the smelter has been erected'.²⁴⁰

THE BATTERY AT WORK

Skilled men were brought from overseas to assist. An expert mining engineer from Melbourne, Matthew Buchan Jamieson,²⁴¹ who chaired the half-yearly meeting of shareholders in December,²⁴² assisted with the construction of the plant.²⁴³ An American analyst and assayer for B.H.P., J.G. Poage, supervised the smelting during Howell's absence.²⁴⁴ William Adams, Jr., brought from America to be battery manager, had been 'associated with' Howell for 16 years and had helped him to erect and operate several similar plants there.²⁴⁵ Whilst relying on outsiders for supervision, Howell trained local men to do the smelting.²⁴⁶

As it was claimed that the new battery could 'profitably treat ore' that was now 'considered almost valueless, and cast aside', parcels for testing

²³⁹ *Te Aroha News*, 3 August 1889, p. 2; for other details on these improved stampers, see Waiorongomai Correspondent, *Te Aroha News*, 6 July 1889, p. 2, 27 July 1889, p. 2; H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

²⁴⁰ *Te Aroha News*, 13 July 1889, p. 2, 3 August 1889, p. 2; H.A. Gordon to Minister of Mines, *AJHR*, 1889, C-2, p. 95.

²⁴¹ See Matthew Buchan Jamieson and John Howell, *Mining and Ore-Treatment at Broken Hill, N.S.W.* (London, 1893).

²⁴² *Argus* (Melbourne), n.d., reprinted in *Thames Star*, 23 December 1889, p. 2.

²⁴³ *Te Aroha News*, 17 April 1889, p. 2, 22 May 1889, p. 2; Share Register, 30 November 1889, Te Aroha Silver and Gold Mining Company, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

²⁴⁴ *Te Aroha News*, 26 September 1888, p.2, 23 October 1889, p. 2; *Waikato Times*, Waiorongomai Correspondent, 31 October 1889, p. 2, 9 November 1889, p. 2.

²⁴⁵ *Te Aroha News*, 6 November 1889, p. 2, 12 March 1890, p. 2; see letter from William Adams, Jr., *Auckland Weekly News*, 14 December 1889, p. 9; H.A. Gordon to Under-Secretary, Mines Department, 26 January 1890, Mines Department, MD 1, 6/4/31, ANZ-W.

²⁴⁶ *Te Aroha News*, 24 August 1889, p. 2, 28 August 1889, p. 2.

came from Tui, Waiorongomai, Karangahake, Thames, Tararu, Maratoto, Puhipuhi (near Whangarei), the South Island, Queensland, and Adelaide.²⁴⁷ When the first parcels were treated, the results were 'kept particularly quiet', the public being told only that the new stampers were 'doing first-class work'.²⁴⁸

The water jacket smelter was the last piece of machinery to commence working, on 19 September, again under Howell's supervision. He

had the difficulty to contend with of having no metallic lead available, consequently the well had to be filled by lead melted from lead ore after operations had commenced; and starting under such circumstances is most unusual, as there is a great danger at first of the slag getting down into the lead well and (as it is termed) "freezing" there. Under Mr Howell's skilful supervision, however, everything worked most smoothly from the first, and has since gone on without the slightest hitch of any kind. During the first twenty-four hours ... 7 tons of bullion had been run off into the moulds, with 4 1/2 tons in the lead well. The moulds hold about 100lb of ore each. 10 tons of lead ore were first put through, the slag from which shows by assay only 3dwt 6gr silver per ton, and no gold. Since then concentrates and siliceous ore are being put through, the slag from which by assay showed only 1dwt 15gr silver, and 2.75dwt lead per ton; one ton of slag representing nearly two tons of ore; which proves how thoroughly well the furnace is doing its work, the slag being left valueless. The bar bullion will be shipped direct to the refiners in England. Mr Howell is to be congratulated on the highly successful manner in which the furnace has worked from the very start, and is now working.²⁴⁹

Once in full operation, the battery operated day and night in three shifts.²⁵⁰ Early in October, Howell stated that the water jacket furnace was working splendidly: 'he never saw a furnace that has given so little trouble,

²⁴⁷ *Te Aroha News*, 27 April 1889, p. 2, 22 June 1889, p. 2, 14 August 1889, p. 2, 4 September 1889, p. 2, 7 September 1889, p. 2, 28 September 1889, p. 2, 12 October 1889, p. 2, 23 November 1889, p. 2, 4 December 1889, p. 2; *Waikato Times*, 24 August 1889, p. 2, 31 October 1889, p. 2, 23 November 1889, p. 2.

²⁴⁸ Waiorongomai Correspondent, *Waikato Times*, 20 August 1889, p. 2.

²⁴⁹ *Te Aroha News*, 21 September 1889, p. 2; see also *Waikato Times*, 28 September 1889, p. 2.

²⁵⁰ *Te Aroha News*, 7 September 1889, p. 2.

or done better and cleaner work'.²⁵¹ By the end of the month, 2,500 bars of bullion, approximately 100 tons, had been produced, and the amount of ore ready for smelting was being used up quickly.²⁵² Some of the 'concentrated and siliceous ores from Karangahake, Maratoto, etc, were treated at the rate of 20 to 28 tons daily'.²⁵³

The first meeting of shareholders held after production began, held in Melbourne on 29 November, was informed that the bullion bars produced contained 'over 99 per cent of the assay values of the crude concentrates and ore smelted. Nearly the whole of the gold and silver contained in the bullion had been obtained from ores with the most refractory character which by ordinary methods of treatment would have been lost'.²⁵⁴ In mid-December, Howell and Patton, the general manager of B.H.P., informed Wilson that during the plant's first two months' operation it had been 'successfully treating the most refractory ores from the Company's mines and other mining Districts at a cost per ton far below our former estimates'. A 'high percentage' of the valuable metals had been extracted from 'base ores which have heretofore been valueless' at a cost of under 7s per ton of crude ore 'and all the valuable metals put in a marketable form'.²⁵⁵ Earlier, Melbourne shareholders had been told the average cost of treating crude ore was 'less than 6s per ton'.²⁵⁶ But there had been problems, even including possible sabotage in April:

The new 14 inch pipe which has been laid down for some time past, and which is to convey the water for driving the Boss pan plant, has now been connected with the large water tank on the hill. After the water was turned on to test the joints and seams, it was observed that considerable leakage was taking place near the lower end of the piping which is covered up by some six or seven feet of tailings. In order to remedy the defect the tailings were removed, and when the pipes were laid bare it was discovered that two or three holes had been cut in the piping. How this was done is a matter of conjecture.²⁵⁷

²⁵¹ *Te Aroha News*, 9 October 1889, p. 2.

²⁵² *Te Aroha News*, 26 October 1889, p. 2, 30 October 1889, p. 2.

²⁵³ Te Aroha Correspondent, *Thames Star*, 23 October 1889, p. 2.

²⁵⁴ *Te Aroha News*, 21 December 1889, p. 2.

²⁵⁵ John Howell and W.H. Patton to W.R. Wilson, 13 December 1889, Mines Department, MD 1, 90/119, ANZ-W.

²⁵⁶ *Te Aroha News*, 21 December 1889, p. 2.

²⁵⁷ Waiorongomai Correspondent, *Te Aroha News*, 13 April 1889, p. 3.

In August the tailings plant briefly closed, believed to have been because the samples producing 'too much iron rust on the pans, thus indicating a predominance of this metal over silver and gold'. A local correspondent commented that it was 'a pity' that the first use of the Boss pans 'should have eventuated so, as the expense and fixing of them must have been very great'.²⁵⁸

COST, AND SUCCESS, OF WORKING

Late in 1889, William Adams, Jr., gave the costs of treatment between 12 January and 1 November. £791 11s 10d had been spent on crushing and concentrating, of which total £643 0s 11d went on wages. 4,488 tons had been crushed for the company and 48 $\frac{2}{5}$ tons for other companies, producing just over 156 tons of concentrates giving an assay value in Thames of £3,221 14s 10d and in London of £3,405 16s 10d. This total did not include amalgam caught on the plates nor the subsequent treatment of tailings. 'Costs of crushing and concentrating [were] about 3s per ton of crude ore treated, and about £4 16s 6d for the ton of concentrates produced'. Desulphurizing the concentrates in the Howell Tubular Cylinder Revolving Furnace cost 'about 3s per ton of concentrates treated, and about 1 $\frac{1}{2}$ d per ton of crude ore from which said concentrates were produced'. Ore and concentrates treated in the reverberatory furnace cost 'about 17s per ton cindered', and the cost of smelting the 'cindered concentrates and siliceous customs ores' in the water jacket furnace was 'equal to about £1 10s 4d per ton smelted'. The total cost per ton for crushing, concentrating, roasting, cindering, and smelting was £3 1s 10d. The water jacket furnace had worked for 30 days from 19 September onwards, treating an average of 20 $\frac{1}{2}$ tons in a 24-hour day; the highest assay of the slag left after treatment was gold, nil; silver, 1oz 12dwt 16gr; lead, 10 per cent. Other calculations revealed that the furnace produced bullion valued at £8,358 3s 11d, '*or equal to a saving of about 99 $\frac{1}{2}$ per cent of the assay value of all ores, concentrates, and base bullion treated*'.²⁵⁹

Henry William Northcroft, the warden, after reprinting some of these figures in his report dated 26 April 1890, concluded that the treatment gave

²⁵⁸ Waiorongomai Correspondent, *Waikato Times*, 3 August 1889, p. 3.

²⁵⁹ *Te Aroha News*, 20 November 1889, Special Edition, p. 2.

‘a substantial profit to the shareholders’.²⁶⁰ There was ‘little doubt that in time the process’, or a modification of it, would be ‘universally used in this peninsula for treating all classes of base ore’. He considered that ‘the property would have been a good going concern now had there been as much ore in sight as the owners were led to believe when they erected their works’.²⁶¹ Partly for the lack of ore, the plant had ceased to operate at full capacity from the beginning of November 1889, and was shut down on 18 January the following year, ‘having treated all the ore they had on hand’.²⁶² In July it was temporarily leased to Edward Jennings²⁶³ and William Morris Newsham²⁶⁴ for treating ore provided by tributers.²⁶⁵

MINING CEASES

In September, mining suddenly ceased in the New Find, taking everyone by surprise, and the number of miners employed fell to 16.²⁶⁶ There had been from 50 to 60 working in this mine, too many in the opinion of one correspondent, who also reported a rumour that ‘extensive prospecting of the Company’s ground’ was ‘contemplated, and experienced men may be put on for this purpose in a week or two’.²⁶⁷ What happened was that tributes were let to eight men on terms that were ‘said to be an equal division’ with the company, an arrangement he considered ‘a weak one’ that was ‘not at all likely to be productive of profit’ to either party. ‘To restore confidence amongst the miners the Company should put on 80 or 100 men to thoroughly prospect’, but he admitted this would not happen.²⁶⁸

²⁶⁰ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, pp. 137-138.

²⁶¹ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 138.

²⁶² H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 136; *Te Aroha News*, 9 November 1889, p. 2, 23 November 1889, p. 2, 15 January 1890, p. 2.

²⁶³ See *New Zealand Herald*, 25 October 1926, p. 10.

²⁶⁴ For paper on his life.

²⁶⁵ *Te Aroha News*, 23 July 1890, p. 2.

²⁶⁶ Waiorongomai Correspondent, *Thames Star*, 19 September 1889, p. 2; Waiorongomai Correspondent, *Waikato Times*, 21 September 1889, p. 2.

²⁶⁷ Waiorongomai Correspondent, *Waikato Times*, 21 September 1889, p. 2.

²⁶⁸ Waiorongomai Correspondent, *Waikato Times*, 28 September 1889, p. 2.

As after eight days the tributers were put on wages, this was ‘encouraging’ and raised the hope that more prospectors would be employed soon.²⁶⁹ According to the *Te Aroha News*, the dismissals that had ‘cast quite a damper over the place, being quite unlooked for’, had been necessary because

payable quartz available for breaking out has become so reduced in quantity that it has been found absolutely necessary to shorten hands and reduce expenses, till such time as new ground has been opened up. For the present, therefore, work will be carried on by one shift instead of three shifts as heretofore, and men will be put on to prospect and open up new grounds with as little delay as possible.²⁷⁰

In October, William H. Patton visited to investigate the mines.²⁷¹ After being appointed by Wilson as general manager of B.H.P. in 1887, when he was praised as holding ‘a premier position in the silver mining world of America’ and being ‘fully conversant’ with ‘very large milling and amalgamating plants’, he had made significant improvements to its mining methods.²⁷² It was reported that he had ‘come to New Zealand entirely on account of his health’ and was not on an official inspection but visiting his ‘very old friend’ Howell; they had mined together in America 24 years previously.²⁷³ Some suspected his visit could be of great significance, and in Auckland it was believed that Wilson, who had just returned to Australia from England, was ‘likely to visit New Zealand again at the beginning of the year’. It is rumoured that some of his advisers, presumably Howell and Pogue, were ‘not altogether satisfied’ that the mines could ‘keep up a permanent supply of good payable ore’. It had been hoped that a steady supply of Karangahake ore would come for treatment, but this was not likely in the near future.²⁷⁴ After a brief visit, Patton left for Auckland to meet friends arriving from America, but returned to ‘make a careful

²⁶⁹ Waiorongomai Correspondent, *Waikato Times*, 8 October 1889, p. 2.

²⁷⁰ *Te Aroha News*, 18 September 1889, p. 2.

²⁷¹ Waiorongomai Correspondent, *Waikato Times*, 31 October 1889, p. 2.

²⁷² Jeremy Mouat, ‘“Just Now the ‘Merican Expert is the Prominent Man.” American Mining Engineers and the Australian Mining Industry 1880s-1910s’, *Journal of Australasian Mining History*, vol. 6 (September 2008), p. 139; Bridges, pp. 174-176.

²⁷³ *Te Aroha News*, 12 October 1889, p. 2.

²⁷⁴ *Auckland Weekly News*, 12 October 1889, p. 22.

examination of the property and the prospects of the mine'.²⁷⁵ According to the *Te Aroha News*, he appeared to be

favourably impressed with Waiorongomai as a field for mining operations on a large scale, and states he has seen few places better adapted naturally for working the reefs advantageously. He also speaks in high terms of the very extensive, and most admirably arranged production works erected under Mr Howell's supervision. Mr Patton, however, does not wish to express any decided opinion respecting the mine, not having gone much into the subject.²⁷⁶

At the beginning of November, Patton returned to Broken Hill accompanied by Howell and Pogue, whose contracts had ended, and William Adams, Jr, became acting manager.²⁷⁷ The full significance of Patton's visit became clear when, upon Howell's departure, the plant was shut down, 'a large number' of workers were dismissed, and it was announced that only mining 'in a comparatively small way' was to continue pending further instructions from the directors. A *Te Aroha News* editorial reported more problems than had been revealed previously:

There can be no doubt whatever that the results, so far, have been disappointing to the Company, on account of the scarcity of payable ore at present available. The "croakers" say the thing is a failure, of course adding force to their statements by the customary "I knew it would be so from the start." On the other hand there are not wanting sanguine ones amongst us who hold totally different views, and maintain the comparative stoppage is only temporary, and that work will shortly be proceeded with on a very large scale indeed.... Nothing is, or can be, definitely known as yet with respect to the future operations of the Company, as the directors themselves have not yet decided on what course of action they will adopt; but it will not be long before the matter will be settled.... The fact of the matter is simply this: mining operations cannot be carried on by the Company satisfactorily, and on the large scale that was intended by this Company when they erected their reduction works, under existing circumstances, owing to inadequate supply of payable ore not being at present

²⁷⁵ *Auckland Weekly News*, 12 October 1889, p. 22; *Te Aroha News*, 12 October 1889, p. 2.

²⁷⁶ *Te Aroha News*, 2 November 1889, p. 2.

²⁷⁷ *Te Aroha News*, 26 October 1889, p. 2; *Waikato Times*, 9 November 1889, p. 2; John Watson to William Adams, Jr., 11 November 1889, A. & G. Price, Letterbook 1889-1891, p. 69, A. & G. Price Archives, Thames; *Te Aroha News*, 1 January 1890, p. 2.

available. Again, the present method of transporting the quartz from the mines to the works, by means of the County tramway, is found far too expensive, both from the actual cost of working the line by the system of self-acting grades, horse grades, etc, and also the cost of keeping the line in repair; whilst a great deal of handling is unavoidable that under a different system could be dispensed with. Further, the present tramway, even when worked up to its greatest capacity, is not capable of transporting more than about half the quantity of ore that the reduction works are equal to treating; and the Waiorongomai ores not being rich, makes it all the more necessary that large quantities be dealt with; quantity being essential seeing richness in quality is wanting. The old system of working the mines by means of short crosscuts, tunnels, shoots, and branch tramlines, is too costly for the quantity of ore obtained.... It is scarcely necessary to point out that were the cost of production greatly reduced, large quantities of low grade ore, that at present will not pay for sending down for treatment, could then be treated at a profit. We are fully warranted in stating that, from the developments in the property so far, and the investigations made, there is good reason to assume that valuable bodies of ore would be intersected at ... depth.... It is well-known that for several years (prior to their taking possession), the New Find portion of the Company's property produced a steady supply of ore of excellent quality. It is only fair to add, however, that the most valuable shoots of ore opened up in this mine had been pretty thoroughly exhausted at the time the property was disposed of to the present owners, as was unfortunately only too clearly proved by subsequent working.²⁷⁸

The shareholders were informed on 29 November that, whilst 'satisfactory results have been obtained in the treatment of refractory ores', other developments in the mines had 'been of a retrograde character. The body of refractory but payable ore which was first exposed had not proved of a permanent character, and work had been suspended on it in different parts'. As the battery had worked so well, 'the Directors would make a determined effort to prevent the closing of the works. The Chairman of Directors intended shortly to visit New Zealand with a view of inducing the Government to subsidize the costly work of driving the low level tunnel' that they believed would best open up their ground.²⁷⁹

²⁷⁸ Editorial, *Te Aroha News*, 9 November 1889, p. 2.

²⁷⁹ *Te Aroha News*, 21 December 1889, p. 2.

A LOW LEVEL TUNNEL?

A low level tunnel had been recommended to Wilson by Howell and Patton on 13 December. They argued that the mines had previously 'been so unsystematically worked and the present methods of mining, handling and tramming the ores' were so expensive that the large bodies of medium and low-grade ores available were valueless.

To overcome this difficulty and make the extensive bodies of ore now exposed in the mines, and the vast bodies of a similar and possibly higher grade ores, which there are good reasons to expect to find at greater depths available for profitable working, we would recommend the driving of the deep crosscut Tunnel into the Main Lode, and thence a drive along the Lode a distance of about 5000 feet to the North end Boundary of the Company's Ground. This Crosscut Tunnel would cut in its course several well defined branch or lateral veins, in which are already developed large bodies of a medium grade of ore, and the Drive on the Main Lode would open all the known ore shoots to a depth varying from 1000 to 1600 feet deep. The outlet of this crosscut Tunnel would be on the line of the present Main Tramway and only about 450 feet above the Reduction Works. The advantages to be derived from working all the Company's Mines through this one Main outlet cannot in a short summary be estimated, but it is quite safe to say that the cost per ton of mining and delivering ores at the works would be less than one-half the cost under our present system and would render available for profitable treatment large bodies of ore now exposed in the mines.

There is probably not in any of the mining districts of New Zealand or Australia another place where such an extent of Gold and Silver bearing Reefs can be opened up by a System of Tunnels, and where the benefits to be derived from such a work are of so much importance. Not only will it greatly cheapen and facilitate the Mining and delivery of ores and drain the whole of the Company's extensive Mineral Holdings, but the water so drained from the Mines will serve as a motive power for increased ore reducing facilities, a matter which in itself is of much importance. The workings in several of the most extensive and valuable ore bodies in the Company's Mines are now down to a level of the Main Tramway, and have also reached the permanent water level so to continue work in these particular places would necessitate the erection of expensive pumping and winding machinery and thereby add considerably to the present cost of mining; so to sum up briefly the present situation it means the driving of the proposed low level Tunnel or abandonment of the whole property. If the tunnel scheme is carried out, there are

reasons for believing that immense bodies of a grade of ore that will leave a fair profit will be found about the line of the Tunnel, and mining and reduction of which will give employment to a large number of men, for many years, and will tend to keep open a work where ores of all classes from all parts of the country can be successfully treated or find a ready cash market. If on the contrary the property is abandoned and the works dismantled, it will, we feel, give a blow to the Mining Industries of New Zealand, the evil effects of which will be felt for many years, and we, therefore, think it advisable to use every endeavor to procure aid from the Government and people of New Zealand in the prosecution of an enterprise that promises so much good to the country at large.²⁸⁰

Howell's plans and specifications, 'produced after the most careful surveys and tests had been made', were approved by Patton.²⁸¹ The surveys had been made in August, when the press had not understood the full extent of what was planned.²⁸² The *Te Aroha News* later gave a detailed description of the plan:

The mouth of the proposed tunnel was to have been just on the further side of the Army Creek bridge, which is about half a mile as the crow flies, or say three-quarters of a mile by the County tramway, from Waiorongomai township. The first 100 feet would have been an open cut (gully), and the tunnel itself start at a height of 495ft above the Company's Battery level; and thence be driven direct into the hill in a north-easterly direction a distance of 1700 feet, which would bring it under the main reef in the Company's special claim, about mid way between the N. and S. end line boundaries; and on striking the lode giving 950 feet of "backs" below the surface (the top of the reef being covered at this point), the main lode, so far as yet worked upon averaging 15 feet to 25 feet wide. The tunnel in its course would also cut the Silver King and several other known lateral lodes, whose outcrops are exposed on the surface line of this proposed crosscut tunnel. The grade of the tunnel would be 1 in 100. Arrived at the point referred to, the Company would drive through the lode and probably commence to drive on the west wall of the lode right up to (and directly under) the New Find ore shoots, a distance of 3,300ft; and leaving 1,630 feet from the last mentioned point to

²⁸⁰ John Howell and W.H. Patton to W.R. Wilson, 13 December 1889, Mines Department, MD 1, 90/119, ANZ-W.

²⁸¹ Editorials, *Te Aroha News*, 9 November 1889, p. 2, 12 July 1890, p. 2.

²⁸² *Te Aroha News*, 17 August 1889, p. 2, 24 August 1889, p. 2.

reach the northern boundary of the Company's mineral holdings. As the work proceeded cross cuts would have been put in at every favourable point, in order to test the value both of the main lode and also of the numerous lateral veins (junctioning with the lode) on the eastern side of the main lode. The point of proposed drive (3,300ft) reached, would give 1,180ft of "backs" to the Smithy level in the New Find mine. From the outcrop of the main reef at this point to the Smithy level, 330 feet in depth, has been stoped out, thus making the total depth from outcrop to floor of tunnel 1510 feet, giving between 1,100 and 1,200 feet of "backs." Connection would of course be made with the Smithy level by rising and sinking. It was intended to have pushed forward the work with all possible speed by means of an air compressor worked by water power, with probably three rock drills at work together. 15 men (3 shifts of 5 each including those employed getting the necessary timber for tunnel, etc.) would have been employed in connection with this part of the work. The size of the tunnel would be about 8ft by 6ft or 7ft, so as to allow ample room for [a] tram line worked by horses. Ventilating machinery would also have been worked by water power. When the Silver King and other lodes of value had been cut, additional men would have been put on to work the same, as found necessary. It was the Company's intention to allow men so desiring to work their ground on tribute (either opened or unopened ground) whilst this great tunnel was being put in; the time necessary to do the work being estimated at from a year and a half to two years.²⁸³

At the beginning of December, the rock drill and condensing chamber were sent to Broken Hill.²⁸⁴ Although the battery would not operate in the new year 'pending further instructions from the directors', mining would be resumed after the holidays 'as before'.²⁸⁵ Wilson and his wife came to Auckland at the end of December, partly on account of his health.²⁸⁶ With his brother Samuel, he spent two days in early January 1890 inspecting both mines and plant, but announced that nothing definite had been decided, apart from the low level tunnel, which would be 'the most important work ever entered upon on this gold field'.²⁸⁷

Clark had first sought government aid in October, after only three weeks of smelting. 'With great regret' he had informed the Minister of

²⁸³ *Te Aroha News*, 12 July 1890, p. 2.

²⁸⁴ *Te Aroha News*, 4 December 1889, p. 2.

²⁸⁵ *Te Aroha News*, 28 December 1889, p. 2.

²⁸⁶ *Thames Star*, 28 December 1889, p. 2; *Te Aroha News*, 1 January 1890, p. 2.

²⁸⁷ *Te Aroha News*, 8 January 1890, p. 2.

Mines there was a 'probability' of the company going into voluntary liquidation and the plant being 'dismantled and dispersed' because the ore had 'proved much lower in quality than previous tests indicated'. The directors did 'not consider it worth their time and trouble particularly from such a distance to run a mere Customs Reduction Works', meaning one treating ore supplied by other goldfields, and being 'Melbourne men they cannot be expected to look at the venture from a New Zealand point of view'. The plant was of 'Colonial importance', for it had proved the benefits of the chlorodizing, roasting and smelting processes, and its loss 'would be a public calamity'.

I would therefore respectfully urge upon the Government that an enquiry be made in this matter with the view if considered advisable of keeping those works running if even for a limited time - either by subsidizing the company say for two years or by purchasing the works outright and running them on Government account as has been done in Germany so successfully and with such benefit to the mining interests of that country.'²⁸⁸

Although this request had been ignored, in January 1890 Wilson sent Mitchelson, then the Acting Premier, a copy of Howell and Patton's letter. He explained their qualifications, the amount of money spent, and asked for £ for £ assistance; the estimated cost of £40,000 meant both government and company would have to provide £750 per month. 'We would be willing to have the amount of the Government advance made a first charge on the net output of the mine'. Success 'would mean the finding of many years work for at least two thousand miners', but should the application be refused, there was 'no other course ... but to dismantle the plant & sell it as chance offers'.²⁸⁹ After interviewing Mitchelson in Auckland, Wilson claimed he had received an encouraging response, Mitchelson being 'most favourable impressed with the proposal'.²⁹⁰ 'Failing that assistance', it was

²⁸⁸ J.M. Clark to Minister of Mines, 7 October 1889, Mines Department, MD 1, 90/119, ANZ-W.

²⁸⁹ W.R. Wilson to Edwin Mitchelson, 6 January 1890, Mines Department, MD 1, 90/119, ANZ-W.

²⁹⁰ Te Aroha Correspondent, *Waikato Times*, 9 January 1890, p. 2; Hamilton Correspondent, *Auckland Weekly News*, 1 February 1890, p. 13.

‘freely mentioned’ that the works would be ‘dismantled forthwith and the plant sent to Australia’.²⁹¹ The *Te Aroha News* wrote that the tunnel

would be a big undertaking for any company, involve the expenditure of a very large sum of money, and require probably at least a couple of years to complete, even with the aid of rock drills, as the distance to be driven before arriving at a point underneath the existing known main shoots of ore, would be about 10,000 feet.

The government had ‘practically done nothing to encourage the proprietors of the existing plant’, who had spent from £50,000 to £60,000 in just a year and a half.

We hear a great deal about Protection and the developing of the natural resources of New Zealand from the present Government, and in the matter referred to we trust they will be consistent, for it would be nothing short of a public calamity, and a standing disgrace to the Government, if, through lack of any assistance they would give, the reduction works at Waiorongomai were to be finally closed down, dismantled, and the plant sent out of the Colony.²⁹²

A Hamilton correspondent stressed the large amounts spent in the South Island on water races and similar works that were ‘too large for unassisted private interest, but which would benefit the goldfield assisted as a whole’. It was claimed that the tunnel would do more to discover the system of reefs ‘than any number of parties could effect’ by surface prospecting, and anticipated work for ‘a large mining population, and the profitable expenditure of capital from outside the colony’. As the project was ‘as practical as it is bold’, it deserved assistance, and the government’s response was ‘anxiously looked for’.²⁹³ Immediately after Wilson’s letter to Mitchelson, a telegram of support was sent by a mine owner at Waiorongomai, Peter Ferguson,²⁹⁴ who stressed that the tunnel would intersect several lodes in his special claim, from which he had obtained

²⁹¹ Te Aroha Correspondent, *Waikato Times*, 9 January 1890, p. 2.

²⁹² Editorial, *Te Aroha News*, 9 November 1889, p. 2.

²⁹³ Hamilton Correspondent, *Auckland Weekly News*, 1 February 1890, p. 13.

²⁹⁴ See paper on Peter Ferguson and his New Era.

‘very encouraging results’, and would enable him to prospect ‘at a great depth’.²⁹⁵

Prodded by Wilson, who telegraphed that he would be in Wellington on 27 January, Mitchelson asked Gordon of the Mines Department to visit ‘at as early a date as possible and report fully’.²⁹⁶ Accompanied by the mining inspector and Professor James Black, Gordon visited in late January, when a good find was made in the Premier portion of Ferguson’s ground. A local correspondent considered that

these new and encouraging prospects unmistakably demonstrated to the entire satisfaction of Mr Gordon, taken in conjunction with the facts and figures about the Te Aroha Company already before the Government, and the potent influence of the wealthy Wilson, of Broken Hill, should have much weight in diverting the hitherto too pastoral mind of the present Government to the claims of the reefers and miners of this and other mining districts.²⁹⁷

Gordon’s report, written on 24 February, gave full details of the proposal and considered the likely consequences both of driving and of not driving the tunnel:

The proposal of the Company is to construct an adit level from Army Creek to cut the Buck reef at 900 feet below the surface. The length of this level would be about 1,800 feet, in constructing this adit they would be likely to cut the principal reef that goes through the Silver King at 1030 feet, the one coming through the Werahiko at 1340 feet and the Welcome Reef at 1570 feet.... If payable stone is not found as soon as the main lode is cut it is then proposed to carry the adit along the main reef for about 3,800 feet, which will bring it under the workings in the New Find ground, when there will be about 1180 feet of backs below what is known as the Smithy level as shown on the accompanying plan. The total distance of adit proposed to be constructed is 5,600 feet, which would probably cost, including air compressing and ventilating appliances together with rock-drills, about £30,000,

²⁹⁵ Peter Ferguson to Premier, January 1890 [date lost because of water damage] (telegram), Mines Department, MD 1, 90/119, ANZ-W.

²⁹⁶ W.R. Wilson to Edwin Mitchelson, 11 January 1890 (telegram); H.A. Gordon to Minister of Mines, 11 January 1890; Minister of Mines to H.A. Gordon, 11 January 1890; Edwin Mitchelson to W.R. Wilson, 14 January 1890 (telegram), Mines Department, MD 1, 90/119, ANZ-W.

²⁹⁷ Te Aroha Correspondent, *Waikato Times*, 1 February 1890, p. 2.

but the cost would depend entirely on the hardness of the rock to be gone through; still the amount mentioned should be about the maximum.

In regard to the probable success of the project, the indications are such as lead one to suppose that there are several runs or shoots of gold in the main buck reef that will be found profitable for working, at the same time it must not be inferred that these runs will be a great length, there may be a shoot of auriferous stone for 100 feet or 200 feet long, and then a barren portion and then another shoot will be found and so on. This has been the case on the outcrops, rich patches of auriferous stone have been worked on the main buck reef in the New Find ground, and at the time of my visit Mr Ferguson discovered a rich shoot of gold on this reef to the northward of the Te Aroha Silver and Gold Company's boundary. This proves that the main lode is not barren; that gold exists here and there especially near the junction with other reefs.

The main lode that runs through the Company's property is from 10 to 20 feet in width, and with the plant they have erected very low grade ore could be made to pay for working, especially if a low adit were constructed, as that would dispense with two steep grades on the present tramway and considerably lessen the cost of transit of the ore from the mine to the battery, indeed the project now proposed ought to have been undertaken by the present company before erecting such an extensive plant, and even at the present time it would be better for them to do this and thoroughly test the ground before taking into consideration the removal of their plant, as the indications are such as would lead one to infer they hold a valuable property....

With reference to the Company shifting their plant it would be a loss to the District, and it is questionable if so extensive a plant would be again erected. At the same time the loss the company would entail would be so considerable that it is probable they will test the ground further before adopting such a course. To remove the plant out of the Colony it would not be worth one fifth of the original cost as a large portion of the outlay is in Buildings, Water Races, Brick furnaces and foundations, Framing &c which would never pay to remove out of the Colony, neither could the Pelton Water Wheels be utilized in Australia.

Referring to the implications of the proposed subsidy, he warned that
it

would no doubt open up a precedent and other Companies throughout the Colony would make similar applications which would be difficult to refuse. It is therefore a question of policy for the Government to consider in granting or refusing the

Company's application. The subsidy applied for is for the direct benefit of a private Company and if the application were entertained the Government should have security on the whole of the Company's plant for the repayment of the money advanced.²⁹⁸

Gordon summarized the proposal in his annual report, adding that the company proposed 'to construct uprisers on the lode at different intervals. By this means the lode would be prospected systematically' and there was 'fair reason to believe that a valuable mine would be opened up'. The proposed tunnel was a bold project that was 'likely' to succeed.²⁹⁹ Warden Northcroft warned that, while it 'would undoubtedly open up the property ... the cost would be considerable'; he doubted the shareholders would 'care to risk so much capital in mere speculation, which, like nearly all gold-mining ventures, it really is'.³⁰⁰ Gordon's report was discussed by the Cabinet, which, no doubt influenced by the warning about setting a precedent leading to endless requests from private enterprise, made a firm decision: 'Cannot be granted'. The Mines Department was directed to reply 'that we regret exceedingly' that lack of funds prevented granting the request.³⁰¹ The *Te Aroha News* would argue in 1895 that, had the Liberal Government been in office, there was 'hardly a doubt' the money would have been granted, 'but the Atkinson Ministry was notoriously indifferent, if not inimical to goldmining'.³⁰²

Efforts were made to change the government's mind. In May, William Archibald Murray, a former Member of Parliament now farming in the Piako district,³⁰³ sent a copy of his letter published in the *Te Aroha News* to the Colonial Secretary. He understood the company was offering to spend £30,000 if the government would lend £10,000, which he considered 'much more liberal and business like than demands to aid gold mining have hitherto been'. The under-secretary was instructed to 'Reply as before', and

²⁹⁸ H.A. Gordon to Under-Secretary, Mines Department, 24 February 1890, Mines Department, MD 1, 90/119, ANZ-W.

²⁹⁹ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 43.

³⁰⁰ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 138.

³⁰¹ Memoranda of 3 March 1890; Minister of Mines to W.R. Wilson, 3 March 1890, Mines Department, MD 1, 90/119, ANZ-W.

³⁰² Editorial, *Te Aroha News*, 23 February 1895, p. 2.

³⁰³ See paper on his life.

Murray, informed that there were no funds available, conveyed this response to a public meeting at Te Aroha.³⁰⁴ In July, the *Te Aroha News*, in publishing details of the tunnel, regretted it was another example of how the government had not, 'so far, evinced much desire to foster the mining industry' or 'to encourage foreign capitalists to develop our mining resources'. The tunnel was 'of great importance not only to this goldfield but to the whole of New Zealand' because it meant the plant would remain. 'Every day' made 'more and more plain' the need for 'testing works in which ores, which do not readily yield to ordinary methods of treatment, may be handled by experts of wide experience and the highest and latest scientific knowledge'. The government

should have stretched a point, if necessary, to have given the desired assistance. It would have undoubtedly have resulted in more foreign capital being introduced in the Colony, for the development of its mineral resources; many capitalists from Australia, America, and elsewhere would have gone out of their way in order to have visited the company's works,

and probably would have invested in other New Zealand mines.³⁰⁵

THE END

Whilst awaiting the government's response, the company was granted four month's protection.³⁰⁶ Later extensions of protection were also granted, but after mid-1890 for two months instead of the four sought.³⁰⁷ In his annual report, dated 26 April, Northcroft considered it 'very doubtful' the company would recommence work.³⁰⁸ However, one Te Aroha correspondent

³⁰⁴ Letter from W.A. Murray, *Te Aroha News*, 30 April 1890, p. 2; W.A. Murray to Colonial Secretary, 5 May 1890, enclosing letter to *Te Aroha News*; memoranda of 10, 14 May 1890; Under-Secretary, Mines Department, to W.A. Murray, 14 May 1890, Mines Department, MD 1, 90/119, ANZ-W; *Te Aroha News*, 4 June 1890, p. 2.

³⁰⁵ Editorial, *Te Aroha News*, 12 July 1890, p. 2.

³⁰⁶ Te Aroha Warden's Court, Register of Applications 1883-1900, 1-10, 16/1890, BBAV 11505/1a, ANZ-A.

³⁰⁷ Te Aroha Warden's Court, Register of Applications 1883-1900, 22-31, 34, 45-55/1890, BBAV 11505/1a, ANZ-A.

³⁰⁸ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 141.

found it 'difficult to believe that the syndicate seriously contemplate the removal of the plant and the abandonment of the ground'.³⁰⁹ In June, when one of the rotary furnaces was dismantled in readiness for sending to Australia, the *Te Aroha News* consoled itself that the plant could still operate, for the other furnace remained.³¹⁰ In July, having heard 'on good authority' that rent amounting to more than £600 had been paid for the ensuing year, a local correspondent reported residents expecting 'to hear something from headquarters re working of the mines again before long'.³¹¹

Many miners wanting the ground opened for prospecting instead of being locked up.³¹² The only work done on the field was a party of tributers putting in a prospecting drive near Diamond Gully and another party crushing tailings.³¹³ 'Fair Play' of Te Aroha complained that, although two local men, Jennings and Newsham, had leased some stampers, they were not able to lease the appliances needed to treat the refractory ore, nor could men work any of the 225 acres still held by the company. As the New Era Company held another 166 acres, it was 'quite time these companies were informed that they will not be allowed to play the "dog in the manger" policy any longer; that they must in common fairness either man the ground or abandon it, and allow others an opportunity of working it'. The company had been granted eight months' protection, which 'in all fairness' was 'ample time even for a company to decide whether it will work the ground and utilize the water rights, or stand aside and give others a show'. He hoped Northcroft would act, because men were being forced to leave the district through lack of work.³¹⁴

By then there were persistent rumours that the company would sell both plant and mines. A Waiorongomai correspondent believed that the rumour was unfounded, because it had paid all rents, and stated that 'those best conversant with the matters' were satisfied that it would not forfeit any ground', although the company would be 'reformed at the expiration of the present term of protection'.³¹⁵ In August, the *Te Aroha News* wrote that, should the company seek further protection, it was 'not likely that the

³⁰⁹ Te Aroha Correspondent, *Waikato Times*, 22 April 1890, p. 2.

³¹⁰ *Te Aroha News*, 14 June 1890, p. 2.

³¹¹ Te Aroha Correspondent, *Auckland Weekly News*, 5 July 1890, p. 21.

³¹² *Waikato Times*, 12 July 1890, p. 2.

³¹³ *Thames Star*, 28 July 1890, p. 4.

³¹⁴ Letter from 'Fair Play', *Thames Star*, 26 July 1890, p. 4.

³¹⁵ Waiorongomai Correspondent, *Waikato Times*, 7 August 1890, p. 3.

Warden would for a moment grant it in the face of such a rumour'. The company's acting manager, James Napier,³¹⁶ had warned the directors to contradict the rumour officially if they wanted protection extended, but had not received a reply. The fact that he had been explicitly instructed to pay all rents as they fell due, to guard against forfeiture, suggested that the company would not sell its property but instead resume operations at the end of the latest period of protection.³¹⁷

On 28 October, when Napier sought another four months' protection, he informed Northcroft that he 'had made it publicly known that he was ready to receive' any applications for tributes, 'but though he had spoken to a great many he had only so far received one application which he had duly forwarded to the directors'. Northcroft, in granting two months, stated that the directors 'must decide something definite as to their future action within that time'.³¹⁸ Within three days of this pronouncement, a cable was received from Melbourne instructing that both plant and mining leases be auctioned.³¹⁹

On 3 December, there was 'a large attendance of people interested in mining enterprise' at the auction in Auckland. £3,010 was offered for Lot No. 1,

which included the stampers, berdans, furnace, and the greater portion of the plant, besides the leases of the May Queen, Galena, New Find, Silver King, Tower (Waiorongomai), Machine Site, buildings, tailings mill, smith's shop, etc. There being no increase in the bid the property was withdrawn. The whole will now be offered at Waiorongomai without reserve.³²⁰

Within four days, Henry Hopper Adams and his partner, Henry Christian Wick,³²¹ bought all this property for £3,500.³²² The concentration

³¹⁶ See *Cyclopedia of New Zealand*, vol. 2, p. 442; *New Zealand Herald*, 28 January 1924, p. 8.

³¹⁷ *Te Aroha News*, 9 August 1890, reprinted in *Thames Star*, 11 August 1890, p. 2.

³¹⁸ *Waikato Times*, 30 October 1890, p. 2; see also 'Te Aroha Warden's Court', *Thames Star*, 28 October 1890, p. 2.

³¹⁹ *Thames Star*, 31 October 1890, p. 2.

³²⁰ *Thames Star*, 4 December 1890, p. 2.

³²¹ *Cyclopedia of New Zealand*, vol. 2, p. 442; *New Zealand Herald*, 28 January 1924, p. 8.

³²² *Thames Star*, 8 December 1890, p. 2; *Waikato Times*, 9 December 1890, p. 2.

plant was removed for re-use in Australia.³²³ At meetings held in Melbourne in January and February 1891 it was resolved to wind up the company.³²⁴ The *Te Aroha News* wrote that the owners, having failed to obtain government aid for their tunnel, 'preferred the first, certain loss, to risking further capital', and 'the way in which they afterwards did their best to damage the place as a gold producing field, showed neither justice nor generosity on their part'. Because of the destruction of all copies of the local newspaper from mid-1890 to 1895, no evidence survives of any lack of justice and generosity apart from their removal of machinery to Australia, which it described as the plant being 'sacrificed piecemeal'.³²⁵

Those who had run the plant found other posts. In March 1890, when William Adams was appointed manager of the Junction Broken Hill mine on a far higher salary, the *Te Aroha News* regretting his departure as 'a loss to the district, he having great experience in mining generally in America and elsewhere'.³²⁶ He would resign from his new position in the following year.³²⁷ Poage was already employed in that mine, and in that month Napier, a skilled assayer, was made temporary manager.³²⁸ He would be the only one to stay in New Zealand, working as a metallurgical chemist at Waihi, Thames, and Karangahake, where he pioneered the use of cyanide.³²⁹ Howell was expected to return to America, again to general regret, for he had 'by his keen, quiet, and affable demeanour won for himself the sincerest respect and admiration of all'.³³⁰ The *Te Aroha News* wished 'to place on record that by his courtesy, consideration, and gentlemanly bearing', he had 'won the respect and esteem of all', and his

³²³ *AJHR*, 1891, C-4, p. 42.

³²⁴ Notice by John Brandon, n.d., Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

³²⁵ Editorial, *Te Aroha News*, 23 February 1895, p. 2.

³²⁶ *Te Aroha News*, 12 March 1890, p. 2.

³²⁷ *Thames Star*, 1 June 1891, p. 4.

³²⁸ *Te Aroha News*, 12 March 1890, p. 2.

³²⁹ See, in particular, *Thames Advertiser*, 27 July 1891, p. 2, 25 April 1892, p. 2, 20 December 1892, p. 2, 17 April 1894, p. 2; *Cyclopedia of New Zealand*, vol. 2, pp. 492-493; *Auckland Weekly News*, 10 March 1904, p. 41; *New Zealand Mining Handbook* (Wellington, 1906), p. 27; *Waihi Daily Telegraph*, 22 September 1908, p. 2.

³³⁰ Waiorongomai Correspondent, *Waikato Times*, 21 September 1889, p. 2, 31 October 1889, p. 2.

departure was ‘greatly regretted’.³³¹ Instead of returning to America, Howell was appointed manager of the British Broken Hill mine and then became acting manager of B.H.P. during Patton’s eight-month absence.³³² In January 1890 he offered ‘any of the old hands’ at Waiorongomai employment at Broken Hill, at good wages.³³³ The total number who took up his offer was not recorded, but in February a correspondent noted that ‘another’ six men had left for there.³³⁴ Some soon returned.³³⁵ Appointed general manager of B.H.P. in mid-1890 after Patton resigned, Howell’s scheme was used to start the open cut at Broken Hill recommended by Wilson, very successfully.³³⁶ But his introduction of the contract system prompted a violent strike resulting in government intervention and victory for the company.³³⁷ By 1895 he had left B.H.P. and was involved in the Kalgoorlie and Coolgardie fields, including as managing director of Kalgoorlie Gold Mines.³³⁸ Admiration for his skills as a metallurgist were reflected in his becoming one of the three vice-presidents of the new Australasian Institute of Mining and Metallurgy in 1893, and in his being asked to inspect the newly-discovered Mount Lyall copper field in Tasmania. He ceased to be general manager of B.H.P. in January 1895, later that year becoming the managing director of the new Coolgardie gold mine in Western Australia.³³⁹

OTHER MINING SPECULATIONS BY WILSON, AND THE END OF HIS CAREER

³³¹ *Te Aroha News*, 9 November 1889, p. 7.

³³² *Thames Star*, 12 December 1889, p. 4; *Thames Advertiser*, 13 January 1890, p. 4.

³³³ *Te Aroha News*, 29 January 1890, p. 2.

³³⁴ Te Aroha Correspondent, *Waikato Times*, 20 February 1890, p. 2.

³³⁵ For example, Edmund Cookson: see Memorandum of 27 July 1891, re his farm at Gordon, Lands and Survey Department, BAAZ 1108/103a, ANZ-A; for Patrick Moriarty, see *Te Aroha News*, 14 September 1914, p. 2.

³³⁶ Bridges, pp. 176-178; Mouat, p. 140.

³³⁷ *Auckland Weekly News*, 11 February 1893, p. 28; Bridges, pp. 163-168.

³³⁸ See *British Australasian*, 28 March 1895, p. 452, 4 April 1895, p. 489, 9 May 1895, pp. 700-701, 5 September 1895, p. 1362, 21 November 1895, p. 1866, 19 December 1895, p. 2013.

³³⁹ Blainey, *Rise of Broken Hill*, pp. 44, 57, 58, 103; *Te Aroha News*, 14 August 1895, p. 2.

In 1890, Wilson invested £5,000 in another unsuccessful New Zealand mining venture, the Puhipuhi silver field.³⁴⁰ Four years later he was acquiring mining properties in Western Australia, including ‘the Thompson Reef mine’ at Cue, which ‘recently gave 253oz of gold from 50 tons’.³⁴¹ In the following year, during the mining boom, the *Thames Advertiser* wrote that he had ‘speculated a little too early in our district, and in consequence was hard hit at Te Aroha. It was a thousand pities as he is a fine fellow and if he had had decent luck he would most likely now have been one of our foremost mining speculators’. It hoped he might be tempted ‘to try his luck again’ as the conditions were ‘so much more favourable than on his first ill-fated visit. Who knows? He is a man of undaunted pluck and not easily frightened’.³⁴² It reprinted an article in the *Mining Standard* about Wilson receiving ‘a well-merited compliment’ when leaving Coolgardie, where he had invested ‘generously’, recently:³⁴³

No man is better liked by the mining community than Mr Wilson. His passport to general esteem lies not in wealth which he employs so generously, but rather (as Lord Fingal expressed it at the public dinner to Messrs Wilson and Read) “in his sterling qualities and good fellowship.” Other speakers very justly gave recognition to Mr Wilson’s splendid pluck and enterprise in gold-mining; and it must be admitted that Westralia owes him more than the whole body of Melbourne speculators combined. He has been in the van both on the Murchison and Coolgardie fields, accelerating developments at new finds, and doing the expensive pioneering shunned by less courageous men. Mr Wilson admitted that to him one of the greatest attractions of mining was association with the many good fellows which the rush brought together.³⁴⁴

With his brother he continued to speculate in West Australian mines, notably at the Menzies goldfield.³⁴⁵ With his brother and the manager of the

³⁴⁰ *Thames Advertiser*, 13 March 1890, p. 2.

³⁴¹ *Thames Star*, 7 February 1894, p. 3.

³⁴² *Thames Advertiser*, 25 July 1895, p. 3.

³⁴³ For details of his becoming involved in Coolgardie, see Austin Sprake, *Londonderry: The golden hole* (Carlisle, Western Australia, 1991), pp. 9, 80, 187.

³⁴⁴ *Mining Standard*, n.d., reprinted in *Thames Advertiser*, 25 July 1895, p. 3.

³⁴⁵ See *British Australasian*, 17 January 1895, p. 98, 24 January 1895, p. 142, 14 February 1895, p. 243, 21 February 1895, p. 263, 13 June 1895, p. 924, 20 June 1895, pp. 949-950, 11 July 1895, p. 1053, 25 July 1895, pp. 1144, 1147, 1 August 1895, p. 1184, 22 August

St Albans Stud Farm he revisited Auckland in 1897, for horse racing not mining reasons, and with his wife revisited in the following year.³⁴⁶

According to a story that reached New Zealand, between 1895 and his death in 1900 Wilson lost much of his fortune.³⁴⁷ He was in very poor health for two years before his death, aged 50. 'The deceased gentleman contracted many friendships on his periodical visits to New Zealand, and in Auckland in particular, and ... expressions of regret were universal'.³⁴⁸ He was later recalled as 'dominant in will, achieving popularity by his good humour and generosity'.³⁴⁹

WHAT WENT WRONG?

The general opinion was that the company failed through inadequate prospecting coupled with an unsuitable plant.³⁵⁰ In mid-1890, after noting it had been 'clearly demonstrated' that 'the general run of ore mined at Waiorongomai' was 'suitable for concentration, and more cheaply treated by this method',³⁵¹ Gordon pointed out that even this 'most complete' plant in Australasia was not suitable for every class of ore. Clement Augustus Cornes,³⁵² manager of the Champion mine at Tui, told him

that his company got 23 tons of ore treated at these works, and only got about 46 per cent of the assay-value of the ore; but it must be borne in mind that the ore from the Champion Mine is the most complex and refractory ore found in the colony.... There are also large bodies of ore containing sulphides, selenides, and

1895, p. 1282, 19 September 1895, p. 1432, 31 October 1895, p. 1725, 7 November 1895, p. 1772, 29 October 1896, p. 1816, 3 June 1897, p. 995; Julius M. Price, *The Land of Gold: The narrative of a journey through the West Australian Goldfields in the autumn of 1895* (London, 3 ed., 1896), pp. 146-154; Pat and Brenda Rodgers, *No Sign of the Time: A collection of stories of the Menzies District* (Menzies, 1992); Geoffrey Blainey, *The Golden Mile* (St Leonards, 1993), p. 61.

³⁴⁶ *New Zealand Graphic*, 18 December 1897, p. 816, 3 September 1898, p. 309.

³⁴⁷ *Thames Star*, 20 June 1900, p. 2.

³⁴⁸ *Auckland Weekly News*, 1 June 1900, p. 42, 22 June 1900, p. 1.

³⁴⁹ Bridges, p. 64.

³⁵⁰ See, for example, H.A. Gordon to Minister of Mines, 8 June 1893, *AJHR*, 1893, C-3, p. 72.

³⁵¹ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

³⁵² See paper on his life.

tellurides of silver, which are not suitable for concentration; and it is very questionable if the Boss plant is capable of extracting a large percentage of the silver in this class of ores. Each class of ore has to be treated on its merits, and this means that it requires at each reduction-works an experienced metallurgist to conduct the operations.³⁵³

He believed 'further additions' were required 'to make it suitable for treating every class'.³⁵⁴ Howell insisted to an Australian interviewer in 1895 that the plant had 'proved thoroughly successful, although the mine eventually turned out a failure, the ore bodies giving out at a depth of 200ft to 300ft'.³⁵⁵ But as a geologist, writing in 1913, explained, a month-and-a-half of full operation had revealed the battery to be unprofitable because of insufficient ore, an inappropriate process, and, especially, the cost of fluxes. 'Each ton of local ore and concentrate smelted required a ton of Broken Hill lead-ore, as well as other fluxes. The plant was erected on the assumption that the Tui Mine', which contained 'large amounts of lead-ores, would supply part of the smelting-charge. But the Tui ore was found to carry as much zinc as lead, and could not be used as a flux'.³⁵⁶ After the company's collapse, its local director, Clark, revealed the difficulties of obtaining fluxes. When it erected its 'smelting furnace for the lead process', it announced that it was 'prepared to buy any ore which would bear the cost of smelting' and to purchase concentrates 'to assist in fluxing dry ores'. To promote 'the production of such material they offered to treat parcels of two or three tons free of cost, the company even paying the carriage'. These parcels would be 'put carefully over the concentrators, and returns given showing the assay value of the tailings, the percentage and assay value of the concentrates saved, and the amount which the company was prepared to pay'. However, as managers either did not send samples or sent the very poorest,³⁵⁷ fluxes had to be imported. As an official handbook later noted,

³⁵³ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 46.

³⁵⁴ H.A. Gordon to Under-Secretary, Mines Department, 24 February 1890, Mines Department, MD 1, 90/119, ANZ-W.

³⁵⁵ *British Australasian*, 9 May 1895, p. 700.

³⁵⁶ John Henderson, assisted by J.A. Bartrum, *The Geology of the Aroha Subdivision, Hauraki, New Zealand: Geological Survey Bulletin No.16 (New Series)* (Wellington, 1913), p. 14.

³⁵⁷ J.M. Clark, contribution to discussion of George J. Binns, 'Mining in New Zealand', *Transactions of the Federated Mining Engineers*, vol. 3 (1891-1892), pp. 670-671.

this made the process too costly for treating any but exceptionally high-grade ore.³⁵⁸

As such ore did not exist locally, late in 1889 it was decided that the value of the quartz 'in sight' in the lodes opened up was too low to pay for working.³⁵⁹ Wilson, who had initially been 'struck with the apparent richness of the rock', by November 1889 realized that the process was 'too costly for the amount of gold obtained'.³⁶⁰ Gordon noted in 1893 that this 'most expensive' plant was not suitable to deal with a class of ore which the experts had never treated previously, and argued that no American experts had been able to treat New Zealand ore successfully.³⁶¹ Perhaps not, but Howell had certainly spent some weeks testing it before the property was purchased and the type of treatment determined. In 1895, the *Te Aroha News*, which had once praised the battery at every opportunity, admitted the process was from 25 to 50 per cent more expensive than necessary and that 'the elaborate plant could not save what gold was won'.³⁶² Two years later an Auckland newspaper described the gold as 'so fine that it would not concentrate, and after labouring in vain to effect an improvement in results' the company abandoned the attempt.³⁶³ Also in 1897 an English visitor was told that 'no one' in New Zealand 'has ever been able to run a smelter successfully', and because 'the rich ore gave out' the works were abandoned.³⁶⁴ One historian noted that using chlorination made labour 'a key component of the cost and pushed the company into deficit'.³⁶⁵

The *Te Aroha News* argued that the owners, although 'clever in battery processes', made the 'initial mistake of putting the cart before the horse, or the plant before the quartz'.³⁶⁶ Gordon, at first expecting successful treatment of low-grade ore, wrote in 1889 that there was 'scarcely another

³⁵⁸ *New Zealand Mining Handbook* (Wellington, 1906), p. 27.

³⁵⁹ H.W. Northcroft to Under-Secretary, Mines Department, 26 April 1890, *AJHR*, 1890, C-3, Appendix 1, p. 149.

³⁶⁰ *Brett's Auckland Almanac, Provincial Handbook, and Strangers' Vade Mecum for 1896* (Auckland, 1896), p. 142.

³⁶¹ H.A. Gordon to Minister of Mines, 8 June 1893, *AJHR*, 1893, C-3, p. 72.

³⁶² Editorial, *Te Aroha News*, 20 July 1895, p. 2.

³⁶³ *Auckland Weekly News*, 7 August 1897, p. 13.

³⁶⁴ Radclyffe, p. 154.

³⁶⁵ Sybil M. Jack, 'The Introduction of Cyaniding in New Zealand: A case study in the role of technology in history', *Prometheus*, vol. 2 no. 1 (June 1984), p. 27.

³⁶⁶ Editorial, *Te Aroha News*, 23 February 1895, p. 2.

mining company in the colony' which had 'a greater number of lodes in its ground - namely, ten, with an aggregate thickness of 56 feet'.³⁶⁷ The following year he stated that the company had erected the plant 'without ascertaining whether the quantity of ore necessary to keep it going could be procured from their mine', and very soon discovered there was insufficient ore, thereby repeating the experience of many companies on many goldfields. It was 'the same old story - instead of spending several thousands of pounds in prospecting and testing the mine, the company had full confidence in the information they received, and spent their capital in the erection of a plant'.³⁶⁸ Whilst it was true that Wilson and his associates had accepted Adams' estimate of the amount of ore available, Gordon exaggerated when he stated that the company had done no prospecting.³⁶⁹ This criticism was shared by Richard Seddon, whose Mines Statement of 1891 claimed the owners had 'omitted to leave a portion of their capital to prospect the mine'.³⁷⁰ When visiting Waiorongomai in May, he referred to the misdirection of capital:

Without having first tested the hills and ascertained the quantity and quality of quartz, or proper tests made of the quartz brought to grass, a plant had been put down which was entirely unsuitable, and which has been purchased and sent to Victoria. Nothing was done in the way of testing save a few pans and berdans.... If a twentieth part of the money had been spent in prospecting and assaying the quartz discovered, there might to-day be at Waiorongomai a fine goldfield.³⁷¹

Earlier that month, one prominent mine manager, John McCombie,³⁷² had cited Waiorongomai as

another example of extravagance and waste of money on milling and smelting works, which were said to have cost *thirty thousand pounds*, and which were in complete working order before any efforts were made to ascertain whether the prospective output of

³⁶⁷ H.A. Gordon to Under-Secretary, Mines Department, 8 June 1889, *AJHR*, 1889, C-2, p. 45; for a list of all the reefs, see p. 101.

³⁶⁸ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 42.

³⁶⁹ H.A. Gordon to Minister of Mines, 8 June 1893, *AJHR*, 1893, C-3, p. 72.

³⁷⁰ *AJHR*, 1891, C-2, p. 4.

³⁷¹ *Auckland Weekly News*, 16 May 1891, p. 30.

³⁷² See paper on Billy Nicholl.

ore from the mines adjacent thereto was sufficient in quantity to warrant such lavish expenditure. When this plant was ready for operations there was just about enough ore available to keep it running for the first month, after which it closed down for want of further supplies, and the whole concern has since been disposed of for less than *one tenth* of its original cost.³⁷³

In 1925, he repeated that the mine had not been ‘sufficiently opened up to warrant the erection of the plant’. Had the money spent on this ‘been employed to develop the lode system some of the mines would be going concerns today’,³⁷⁴ a judgment that exaggerated the payable nature of the lodes. The ‘general all-round assay value’ of the ore treated by the company ‘averaged about £1 15s per ton for gold and silver’, the quality greatly varying, ‘a considerable quantity obtained from the New Find’ having averaged £3 to £4. ‘About 60 per cent of the gold and silver contained in the ore’ was ‘associated with base-metal sulphides’ forming ‘about 3 per cent of the weight of the crude ore’; from 75 to 85 per cent of the assay value had been saved.³⁷⁵ The ‘general value’ of the bullion was ‘about £60 per ton’.³⁷⁶

As in so many cases, the company lacked sufficient working capital. At first it had been expected only £20,000 would be spent on working after meeting the expenses of floating the company.³⁷⁷ In practice, according to the *Te Aroha News* from £50,000 to £60,000 was spent in its first year-and-a-half of existence.³⁷⁸ As its records no longer exist, those figures cannot be confirmed, but reconstructing the plant plus repairing the tramway and water races and extending the latter had cost £22,780.³⁷⁹ Within a year of being formed, the company had to request an overdraft limit of £20,000.³⁸⁰

³⁷³ ‘Aboriginal’, ‘General Notes’, *Thames Advertiser*, 8 May 1891, p. 2.

³⁷⁴ *Te Aroha News*, 9 November 1925, p. 5.

³⁷⁵ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 44.

³⁷⁶ H.A. Gordon to Minister of Mines, 1 June 1890, *AJHR*, 1890, C-3, p. 45.

³⁷⁷ *New Zealand Herald*, 23 March 1888, p. 5; Special Reporter, *Waikato Times*, 11 October 1888, p. 3.

³⁷⁸ Editorial, *Te Aroha News*, 9 November 1889, p. 2.

³⁷⁹ H.A. Gordon to Under-Secretary, Mines Department, 24 February 1890, Mines Department, MD 1, 90/119, ANZ-W.

³⁸⁰ Bank of New Zealand, Board Minute Book No. 3, Minutes of Meeting of 21 May 1889, Bank of New Zealand Archives, Wellington.

In late 1890, 'lack of capital' was given as the reason for insufficient development.³⁸¹

Shareholders were required to pay a call of 1s on each share in December 1888, a second call of 6d by 14 May 1889, and a third for the same amount by 27 June.³⁸² Shareholders who did not pay the second call by 31 July forfeited their shares, as did those who did not pay the third by 1 November.³⁸³ In September, a sudden and unexpected reduction in the number of workers employed was believed by some to be because 'the calls have not been coming in as they should', others believing that it was 'a move to prevent the necessity of making another at the present time'.³⁸⁴ By 30 November 1889, £17,008 9s had been received from calls, £2,991 11s was unpaid, and 44,630 shares had been forfeited.³⁸⁵

Although one mining commentator believed the £2,000 salary of the battery manager and £500 salary of the mine manager had been excessive burdens,³⁸⁶ Wilson believed in paying his experts well,³⁸⁷ and these costs did not affect the outcome.

AFTERMATH

In April 1890, the *Te Aroha News* wrote that the closure of the plant and mines 'was the most serious check which mining has yet received on this goldfield. The feeling of disappointment which followed upon that event was in proportion to the high expectations which had previously been entertained'. In what it considered to be a normal reaction, 'the non-fulfilment of hopes unduly raised was followed by a new despondency, and the conclusion was at once jumped to that the closing of the works' meant the collapse of the field, but this was incorrect:

³⁸¹ *Auckland Weekly News*, 1 November 1890, p. 10.

³⁸² Advertisements, *Te Aroha News*, 8 December 1888, p. 7, 13 April 1889, p. 7, 18 May 1889, p. 7.

³⁸³ *Te Aroha News*, 13 July 1889, p. 7, 2 October 1889, p. 2.

³⁸⁴ Waiorongomai Correspondent, *Waikato Times*, 21 September 1889, p. 2.

³⁸⁵ Share Register of the Te Aroha Silver and Gold Mining Company, 30 November 1889, Company Files, VPRS 932, Victorian Public Record Office, Melbourne.

³⁸⁶ 'Obadiah', 'Shares and Mining', *Observer*, 14 February 1891, p. 15.

³⁸⁷ *Te Aroha News*, 21 March 1888, p. 2.

It is well-known that by far the greater portion of the company's capital was expended on costly appliances for the treatment of ores, and comparatively little upon those underground works on which the prosperity of the company really depended. Very much remains to be done before the assertion can be made that the wealth of their mines is exhausted.³⁸⁸

Gordon wrote that the company had proved a curse, not a blessing, 'and put back the development of the field for many years'.³⁸⁹

CONCLUSION

As Gordon feared, the company's failure did leave the field almost abandoned, although Adams, Ferguson, and other local miners attempted with limited resources to continue mining, as described in the papers on these men and the over-view of mining during the 1890s. Not until the boom of the mid-1890s was foreign capital once more enticed to Waiorongomai, to repeat many of the mistakes of these Australian investors. And in all these cycles of enthusiasm followed by disillusionment, much-vaunted experts who arrived as the saviours of the field proved to be fallible. But underlying these failures was the lack of high-grade ore in sufficiently large quantities to justify the heavy expense of providing the plant needed to deal with the district's complex ores.

Appendix

Figure 1: 'A buyer from Broken Hill' [William Robert Wilson], one of the 'Sketches at the Sylvia Park Sale', *Observer*, 11 January 1890, p. 6.

Figure 2: 'Sketch Plan of Proposed Line of Tramway Applied for by H.H. Adams, for the Te Aroha Silver and Gold Mining Company', 7 August 1888, Te Aroha Warden's Court, Mining Applications 1888, 65/1888, BBAV 11289/12a, ANZ-A [Archives New Zealand/Te Rua Mahara o te Kawanatanga, Auckland Regional Office]; used with permission.

Figure 3: John Howell, 'Plan of Additions to Machine Site and Tailing Reserve, tinted brown' [long strip adjacent to both sites], applied for by H.A.

³⁸⁸ *Te Aroha News*, 5 April 1890, p. 2.

³⁸⁹ H.A. Gordon to Minister of Mines, 8 June 1893, *AJHR*, 1893, C-3, p. 72.

Adams, 7 August 1888, Te Aroha Warden's Court, Applications 1888, 80/1888, BBAV 11591/1a, ANZ-A [Archives New Zealand/Te Rua Mahara o te Kawanatanga, Auckland Regional Office]; used with permission.

Figure 4: Plan showing extension of machine site applied for by H.H. Adams on behalf of the Te Aroha Silver and Gold Mining Company, 20 August 1888, Te Aroha Warden's Court, Mining Applications 1888, 80/1888, BBAV 11591/1a, ANZ-A [Archives New Zealand/Te Rua Mahara o te Kawanatanga, Auckland Regional Office]; used with permission.

Figure 5: Portion of map of Waiorongomai goldfield, c. 1888, showing Te Aroha Silver and Gold Mining Company's battery, office and 'assay depot', and smelter and tailings plant; in private possession.

Figure 6: Te Aroha Silver and Gold Mining Company, plan of proposed cross cut tunnel and low level tunnel, August 1889, damaged by mould and with existing drives highlighted, Mines Department, MD 1, 90/119, ANZ-W [Archives New Zealand The Department of Internal Affairs Te Tari Taiwhenua]; used with permission. [*Because of its size, is given in three parts.*]

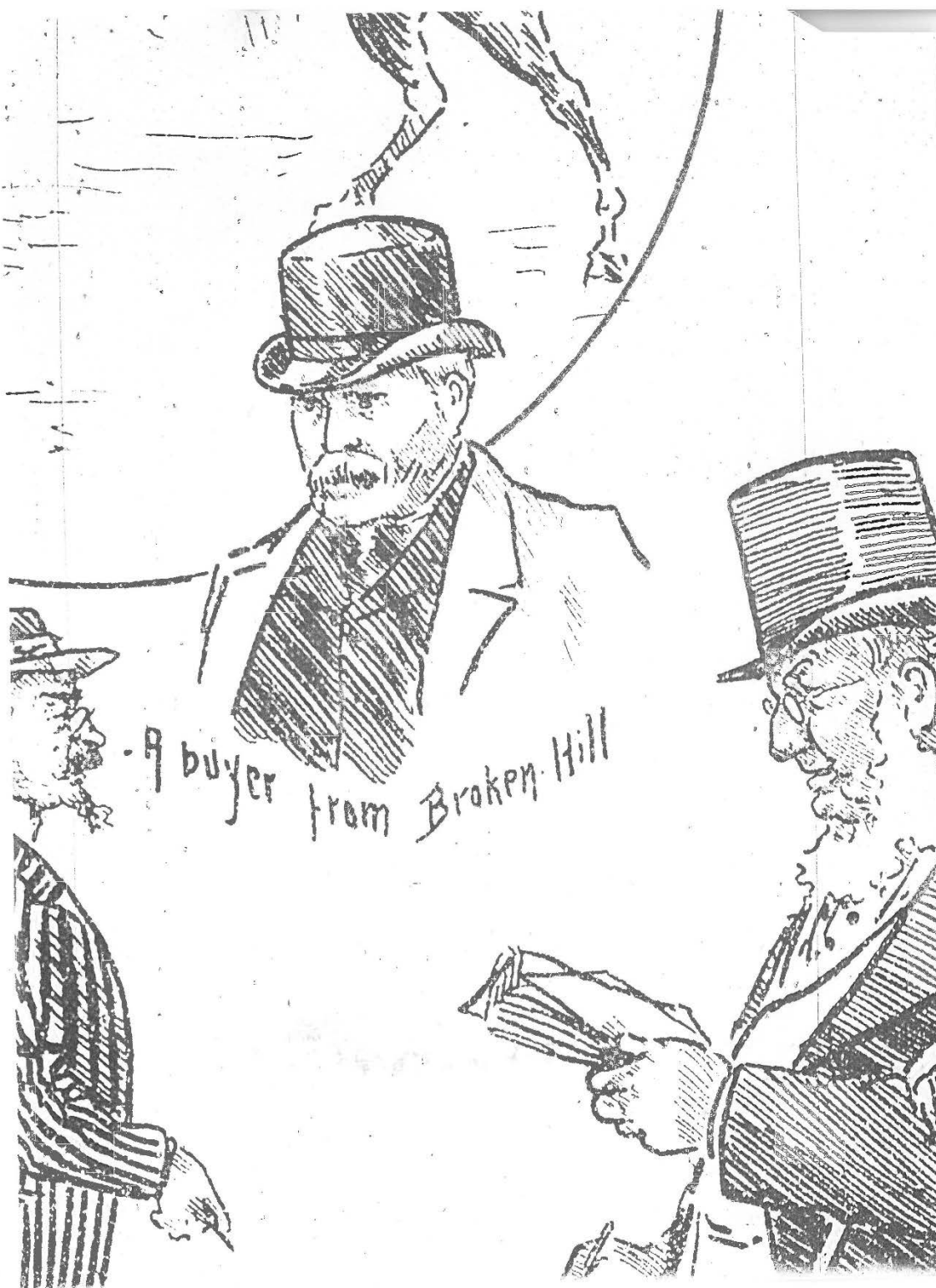


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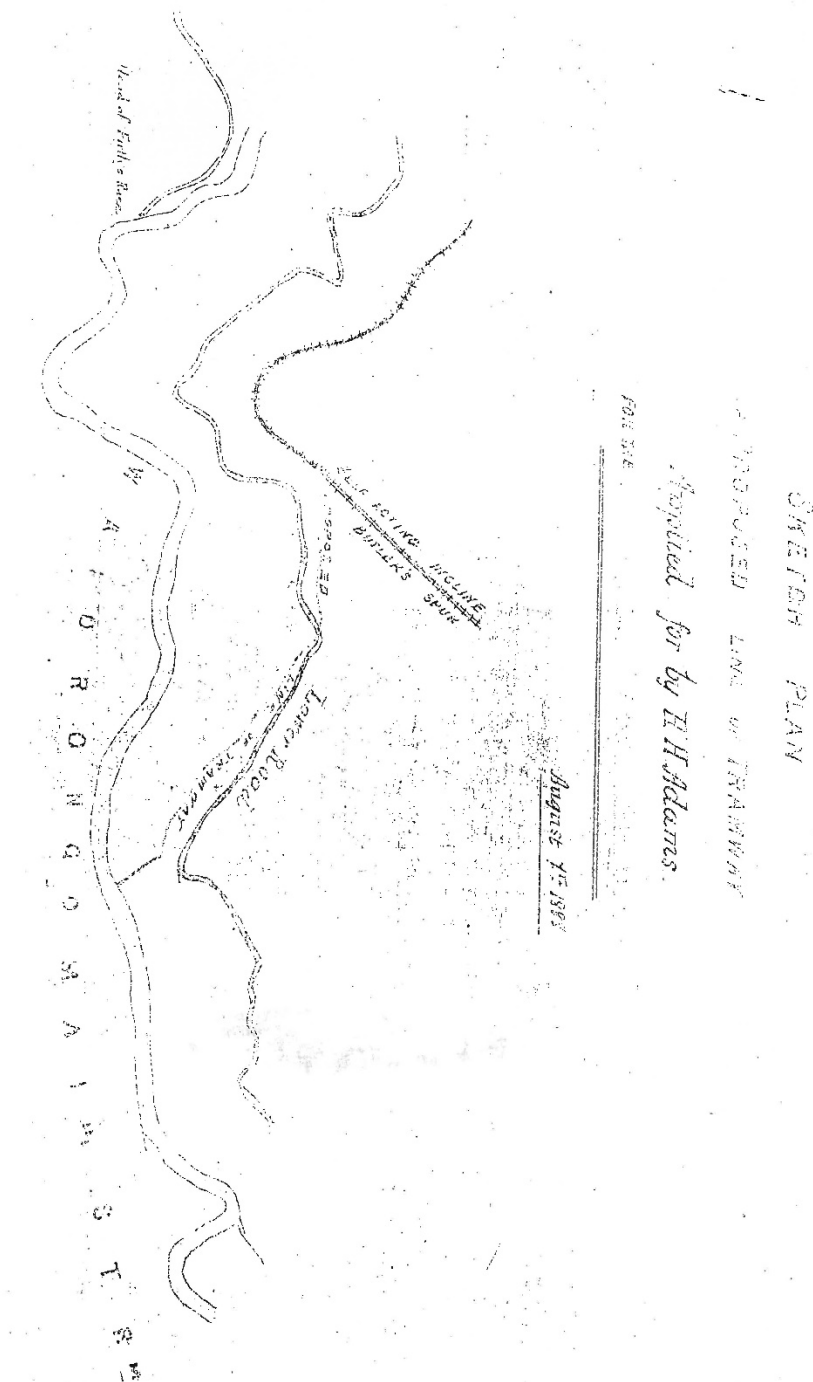


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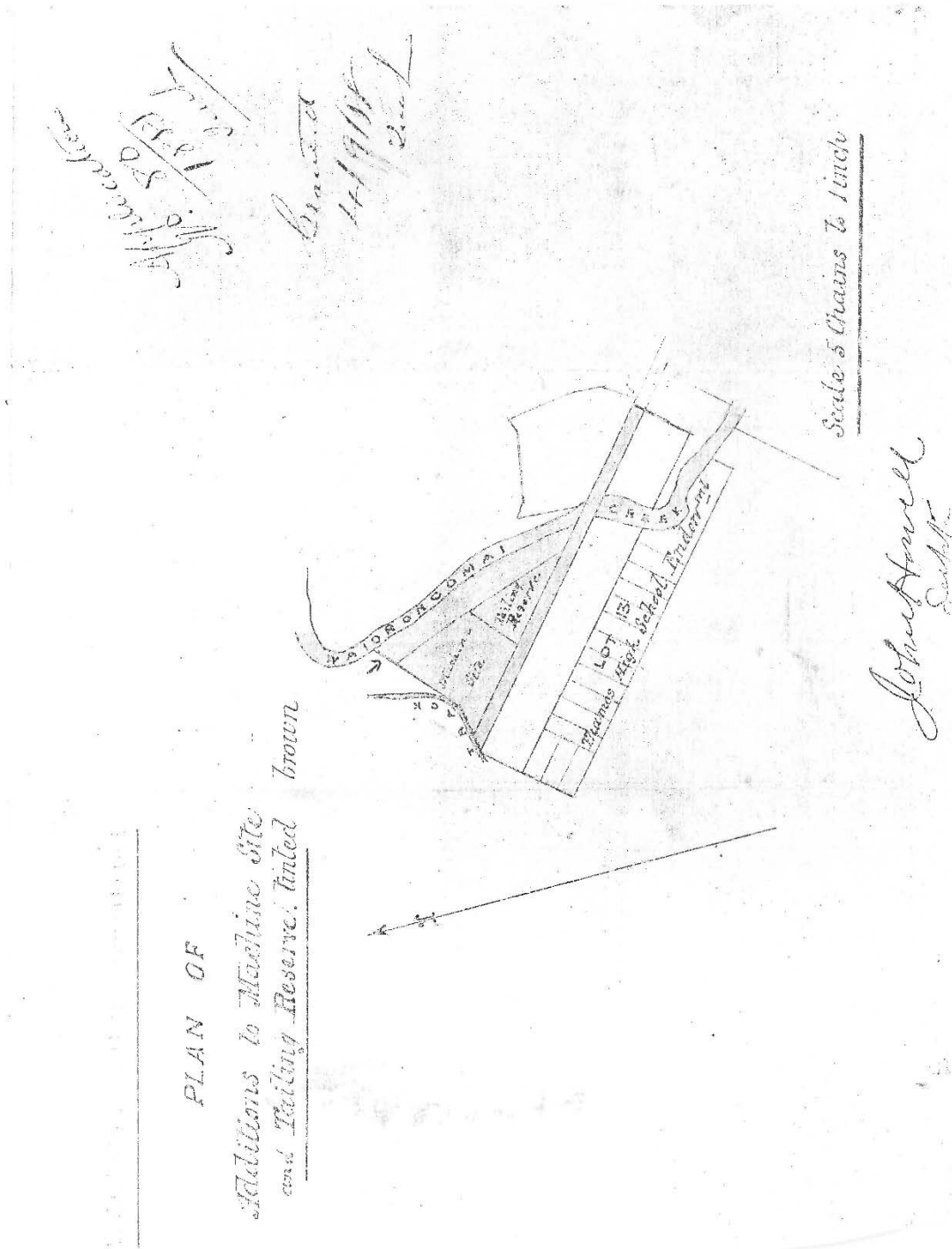


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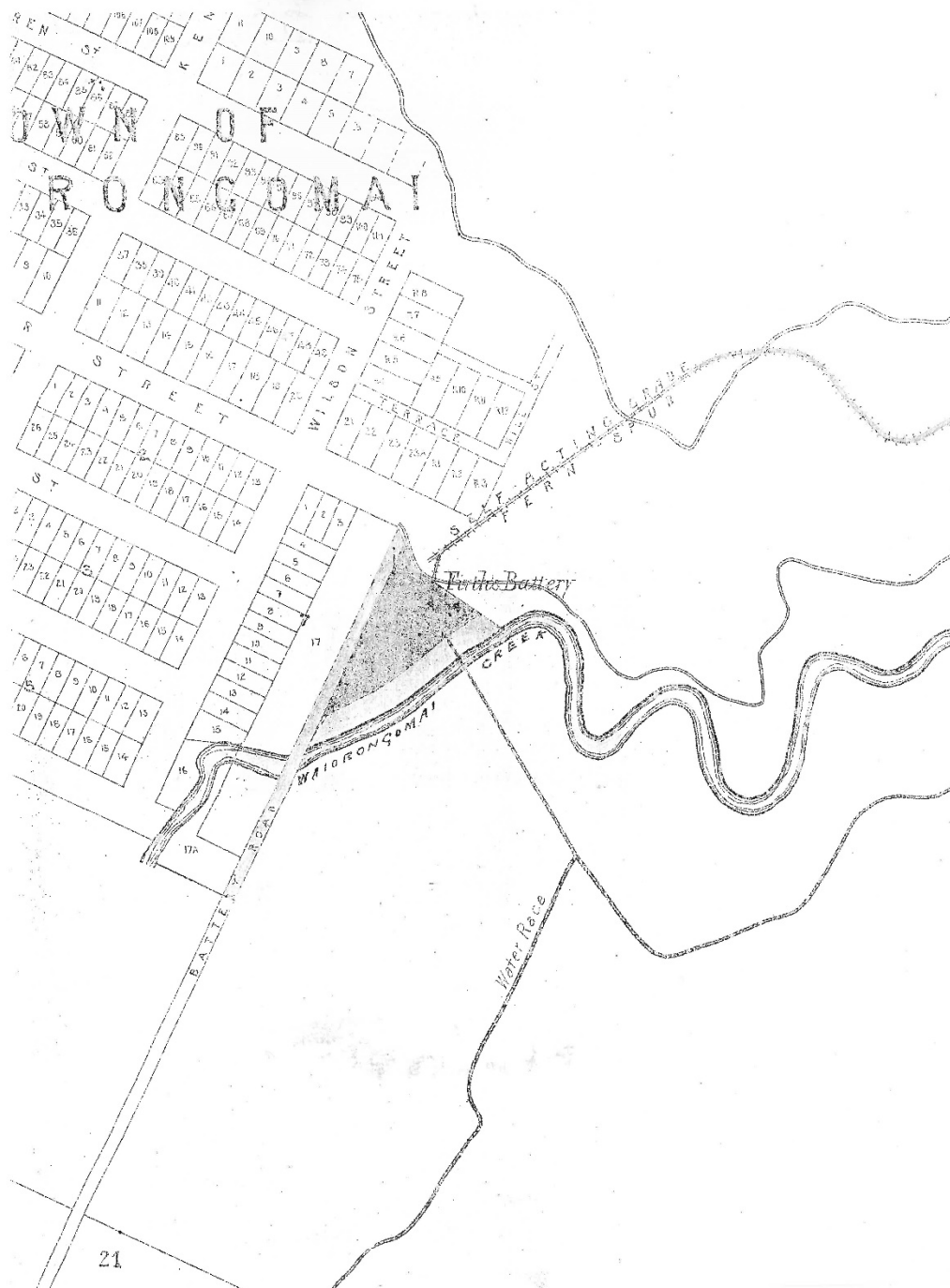


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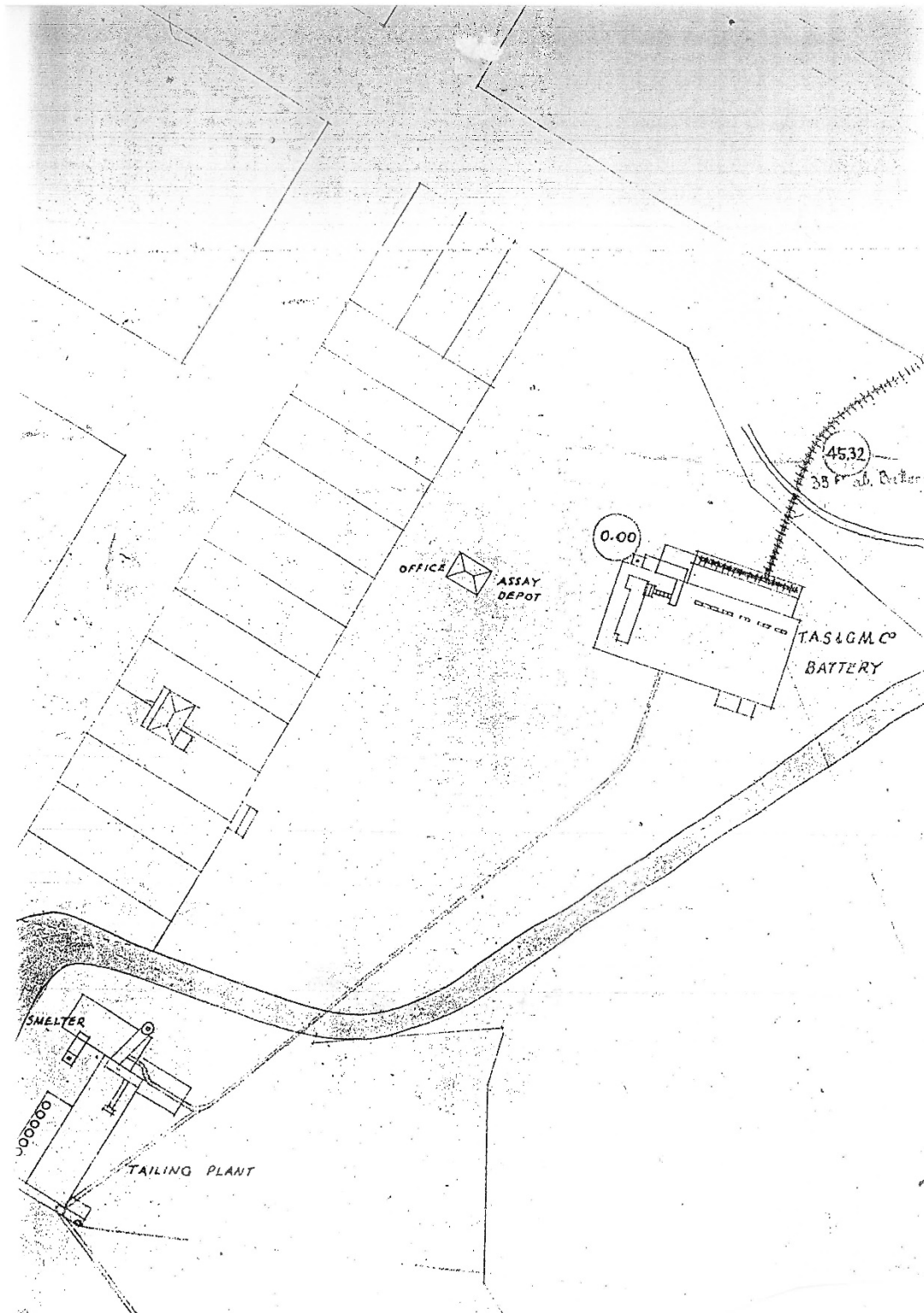


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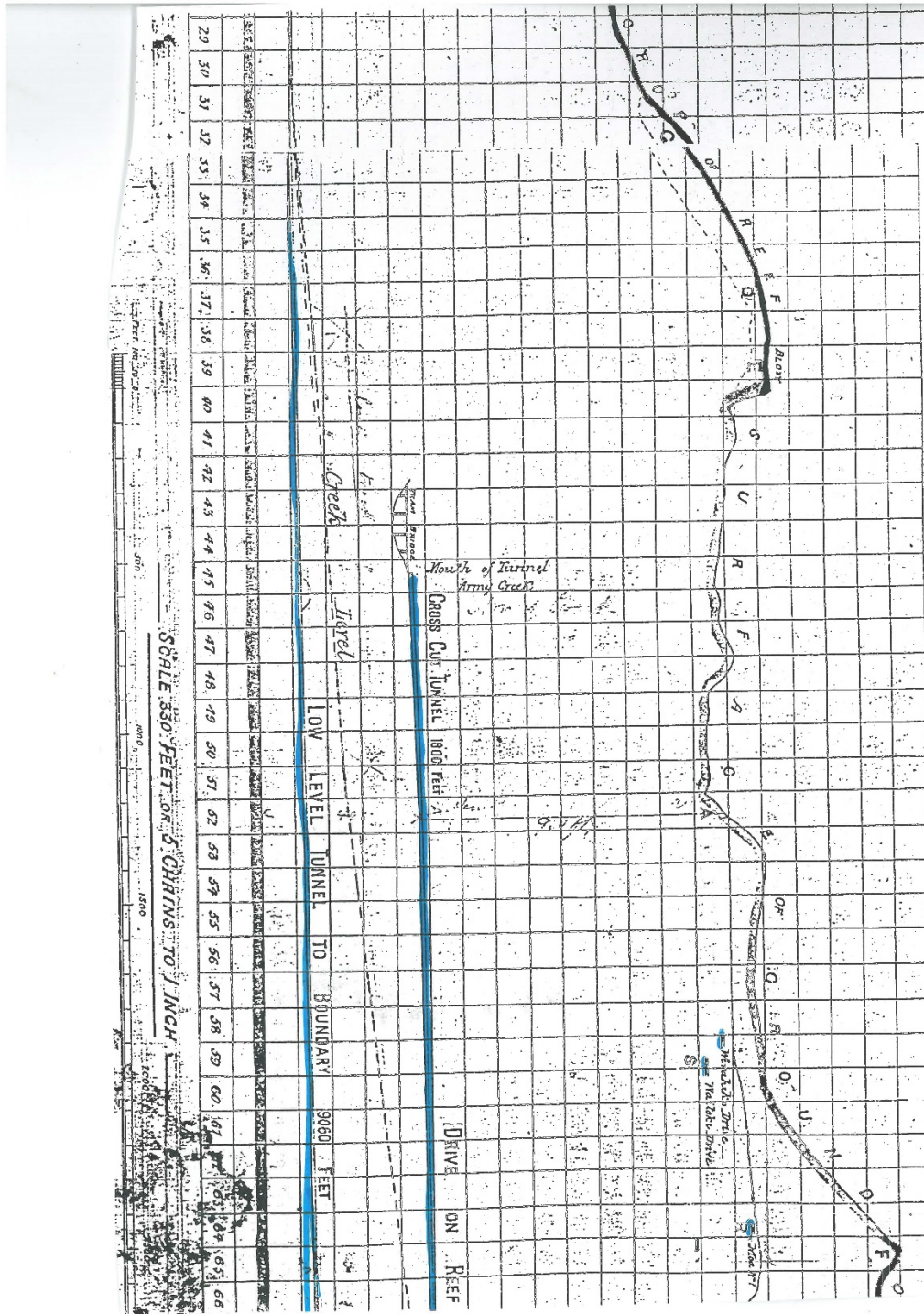


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